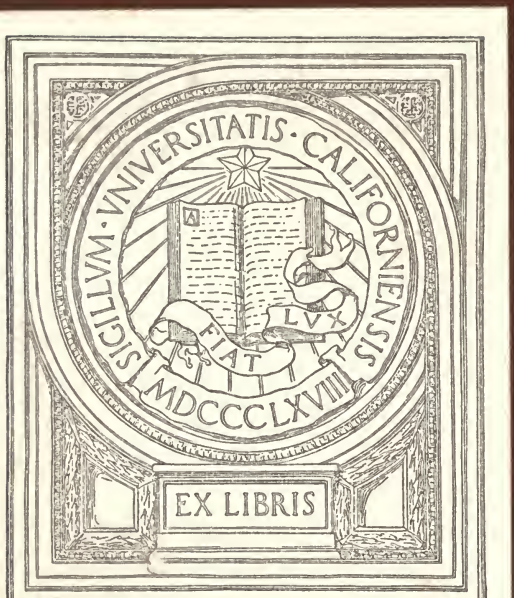
IRRIGATION DEVELOPMENT.


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IRRIGATION DEVELOPMENT.

HISTORY, CUSTOMS, LAWS, AND ADMINISTRATIVE SYSTEMS RELATING TO IRRIGATION, WATER-COURSES, AND WATERS IN FRANCE, ITALY, AND SPAIN.

THE INTRODUCTORY PART

OF THE

REPORT OF THE STATE ENGINEER OF CALIFORNIA,

ON

IRRIGATION AND THE IRRIGATION QUESTION.

WM. HAM. HALL, C.E.,

State Engineer.

SACRAMENTO:

STATE OFFICE, : : : JAMES J. AYERS, SUPT. STATE PRINTING.

1886.

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Sacramento, Cal., December 31, 1885.

To His Excellency

George Stoneman,

Governor of California:

Governor:

Herewith is transmitted the First Part of my Report on Irrigation and the Irrigation Question. Accompanying it is a preface to the entire work, to which, with the introduction to the part now presented, I invite your attention for such explanations as it has seemed fitting to offer.

This work was commenced during the administration of the Honorable Wm. Irwin, continued through that of the Honorable George C. Perkins, and has been in progress thus far within your own term.

To the courteous, intelligent, and earnest coöperation of these former governors and yourself, under whose direction it has been prosecuted, allow me to attribute much of the success had in carrying forward and in bringing its results before the public.

With a hearty acknowledgment of my sense of personal, as well as official obligation to you and your predecessors named,

I am, sir, respectfully,

Your obedient servant,

Wm. Ham. Hall,

State Engineer.

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PREFACE.

California has been the scene of an independent development of irrigation practice, laws, and customs. In some respects the outcome has not been satisfactory to her citizens. The irrigation interest has been shadowed by a cloud of litigation. The courts have been crowded, and the legislature has been embarrassed by a multitude of perplexing questions and conflicting measures. We have seen much progress; but how much more might there have been had the waters of this state been utilized under a wise system from the beginning of her growth. Without doubt thousands of most desirable settlers have been kept away by current reports of water-right and irrigation litigations. Without doubt many millions of capital have been diverted to other channels, which under settled conditions would have been devoted to the development of local agricultural interests.

A notable group of circumstances has brought about this condition of affairs. Here have met and sought to be applied in the promotion of irrigation, certain traditions and customs of the civil law countries of southern Europe, as modified by Mexican practice; the common law water-course rulings of English courts; and a mining water-right jurisprudence, with customs locally evolved under new conditions. Here also have met, to develop this industry and make laws for its governance, people from all parts of the world and in all grades of circumstances, hardly any of whom had the slightest idea of water-right systems or irrigation customs, legislation, administration, or practice.

We have had a development of irrigation practice under most peculiar financial and social conditions. It has had its growth here, not only urged by the necessities of men to take from the ground a support, and the desires of capital for profitable investment, which have been chief incentives to irrigation enterprise elsewhere, but speculation in lands thought otherwise to be almost valueless, and with irrigation believed to be worth, and actually commanding for purposes of investment, an hundred dollars or more per acre, has urged the construction of canal works.

The delightful and healthful climate of parts of our State where irrigation has been apparently most profitable, the charm of a life amidst a semi-tropical foliage which irrigation there supports in luxuriance, and the popular demand for a sanitarium and a region of peaceful homes where light labor would season leisure and add to the enjoyments of life, while at the same time producing a substantial return, has added another strong incentive to the artificial spreading and use of waters. Probably no other country ever experienced the influence of such strong inducements to the diversion of waters, until success in California was followed by like action in some of her sister states and territories.

But before the desirability of taking water from the streams to put it on dry lands became appreciated, there had grown up great interests whose prosperity and life, locally at least, depended upon the maintenance of flow in the natural channels.

Early attempts at irrigation were very crude and wasteful of water, and lands newly irrigated engulfed the precious liquid, as though made of sponge. When, a few years after, its benefits became generally apparent, the supply seemed ridiculously small as compared to the probable demand.

There was rivalry and conflict in taking out waters; there was contention between those who took them out and distributed them and those who wanted to use them; and there was an ever present contest between both these classes and those who wanted the water to remain in the streams for the maintenance or betterment of their personal interests. And these contestations were graded in character according to circumstances.

Varied and many as were the questions thus brought about, they were few and simple as compared to the propositions which were made for their solution. It were vain to enumerate near all the plans put forward in one form or another. In general terms they were: (1) For the United States government to purchase all water-rights and canals in the state, construct great works of storage, diversion, and distribution, sell the water to consumers, and thus render possible the irrigation of all the dry plains: interfering with no one's rights without due compensation. It was urged by the advocates of this plan, in its various phases (and they were not small in number as late as eight to ten years ago, and, furthermore, there are still many who would like to see it attempted),

that the government could well afford the outlay of the millions it would cost; it would be reimbursed an hundredfold in one way or another; that there was ample precedent in the action of the English government in India, for instance; and, furthermore, that it would be vain to attempt widespread irrigation in the state, under any other auspices. It is hardly necessary to say that this general idea was captivating to many persons. Comparatively few people would have opposed it fifteen years ago, and thousands would have hailed its application with personal satisfaction.

(2) Next came elaborations of substantially the same idea, with the state substituted for the general government in the initiative. This outline plan has been more openly and freely discussed than the preceding, because apparently more likely of accomplishment. The same reasons were urged in its favor: The state would be the gainer in every way, and not the least, by the speedy and final settlement of contentions which were occupying and would otherwise continue to occupy its courts and retard the development of its resources. At this day there are very many advocates of some such plan in California; and a session of legislature does not pass without its being brought forward, in some form, with more or less confidence, as a possible and desirable solution of all the difficulty. Its advocates say their time is coming—such action must be taken in the end.

(3) Then came the many and various plans for state action to give the irrigation interest power to take and use waters without let or hindrance from the riparian proprietors who demand that the streams be preserved, or that they have their share of the water if it is to be taken out. It is, perhaps, not necessary to say that these proposed systems have recently been most popular in the counties where irrigation is now an accomplished fact, or in rapid progress. The general idea of all these plans is to put the control of the natural streams virtually in the hands of those who want to use their waters in irrigation, and to give them power to take and pay, or not, as the case may be, for injury to others who would be deprived of them.

(4) Next in order, there is the struggle on the part of the irrigation interest to have it declared, by legislative action, that the riparian proprietors have no rights to water or to the streams, that they never had any such rights in this state, or that they shall have none in the future. And such action, it is thought by many persons, would solve the disturbing problems.

(5) Last, and perhaps newest in the popular view, comes the thought, with its many variations, that the state might and should do much to settle these conflicts, without adopting any of the alleged extreme policies marked out for her under the three preceding general ideas, and that, under any circumstances or plan, it is and will continue to be imperatively necessary for her to adopt some definite policy with respect to her water-courses, and not simply remain a spectator of the various conflicts going on between private parties about them, bearing the expense and suffering the injury which their occupation of the courts and damaging notoriety inflict.

But what is this something to be done? Here again are many minds and many plans. Furthermore, it must be remembered that not all nor by any means a greater part of the citizens of California, politically speaking, admit the necessity for irrigation in their districts: as yet, the so called irrigation counties, even with those next in character to them, are in the minority in the matters of representation and taxable wealth. It is often difficult to convince those who see no benefit to themselves in state action of any kind, and perhaps see a possible inconvenience to them, in the way of interference with some of their customs, that they should suffer taxation permanently to carry out any measure of state policy for direct benefit only in other quarters. And thus, while the advocates of this last idea are by no means agreed as to what form it should take, there are likely to be those who would oppose any system that involved continuous state expense.

Such questions as these have regularly vexed the representatives of the people at every session of legislature held since about 1854, and each struggle has been more intense than the one preceding. At first the immediate interest was confined to a very few counties, having but a handful of the representation, and, as could then be done, the attempt was made to cure the trouble by local or special laws applying to certain counties only. These proved for the most part unsatisfactory. The leading great question, as between riparian claims and appropriation claims, remained untouched, and yearly grew in importance and popular notice. The state constitution does not now admit of local or special legislation, so that this old-time expedient is debarred.

Moreover, nothing definite was known of irrigation itself, outside of the very limited areas or neighborhoods of its practice, and al-

most nothing at all of the irrigation resources of the state. As the probable success of many items of state policy turned upon such matters of fact, the demand for the information was imperative in the halls of legislation; and the fact was recognized, also, that it would be of great value to the irrigators, land owners, and people generally.

Finally, there had grown up other classes of conflicts over the use and management of water-courses and public waters, even more intense than those immediately connected with irrigation. These were the hydraulic mining debris complications, and the arterial drainage or reclamation questions; the intelligent discussion of which also necessitated a knowledge of facts which had never been collated.

Matters came to this stage when, in 1878, a law was passed creating the office of State Engineer. It was a compromise measure adopted in lieu of any one of half a dozen or eight others which severally were based on the general ideas heretofore mentioned, or other plans not necessary to speak of. It provided for an inquiry into the whole subject-matter of the problems before the Legislature, as follows:

SEC. 3. The duty of the State Engineer shall be, under the direction of the Governor, to investigate the problems of irrigation of the plains, the condition and capacity of the great drainage lines of the State, and the improvement of the navigation of rivers.

SEC. 4. In order to carry out the purpose specified in section three, it shall be required of the State Engineer to ascertain as nearly as possible the following named facts, and to express opinions as is hereby required:

First—To ascertain the present water-carrying capacity of the Sacramento and San Joaquin Rivers, in the different sections which are liable to overflow.

Second—Whether this carrying capacity can be increased, and, if so, by what means, and at what cost.

Third—The maximum quantity of water which may reasonably be expected to present itself, on any day, at the head of any of the sections of the rivers as before mentioned.

Fourth—Whether it is possible to make the rivers carry the maximum quantity thus ascertained, and if not, to suggest such other measures as may be judicious for the relief of the rivers and the protection of adjoining lands, and to give detailed estimates of the cost of the suggested works.

Fifth—To ascertain whether there has been any change in the height of beds of the navigable rivers of the State, and if so, to determine as nearly as may be the extent of this change, and the cause or causes to which it is due, and whether change is now taking place in the height of the beds of the rivers, and if so, what legislation, if any, will be effectual in preventing the rise of the beds, or in diminishing the rate of rise.

Sixth—To ascertain the effect of any change in the bottom of the rivers, on their carrying capacity, and in the height of floods in the rivers.

Seventh—To ascertain the position and acreage of all lands in the valleys of the State, which are now or may be in the future in need of irrigation; to divide these lands into their natural districts; to ascertain the water source or sources from which each district may be most conveniently irrigated; to ascertain the quantity of water which these sources can supply in different years for irrigation; the length of time in each year during which these sources will supply sufficient water for irrigation; make studies of the best means for irrigating each district, and give his opinions and advice to such parties as may be engaged in irrigating a district, or who may be about to undertake the irrigation of a district.

Eighth—The State Engineer shall also inquire into the relation which hydraulic mining bears to the navigation of the rivers, and to their carrying capacity; to inquire into the question of the flow of debris from the mines into the water-courses of the State; to ascertain the amount and value of agricultural lands and improvements which have been covered up or injured by the overflow or deposit of debris, coming from the hydraulic and other mines in the Sacramento Valley, and to devise a plan whereby the injuries caused thereby can be averted without interfering with the working of such mines.

Ninth—In addition to making these inquiries, the State Engineer shall make such other investigations as may appear to him to be necessary, and approved by the Governor, for the proper and complete solution of the problems stated in section three.

It must be apparent from the foregoing, to any one at all conversant with such matters, realizing that California has an area as large as that of all the New England states and all the middle states combined, with Maryland and a third of Virginia in addition, and that this investigation must necessarily extend over more than half of her territory, that a very large field for inquiry was opened up for the state engineer, in more ways than one.

The law made provision of money for the prosecution of the work for the first two years, and other appropriations have carried it to this time, when, in accordance with a recommendation by the state engineer, the results to date are being published under legislative instructions.

During the first two years the work was largely devoted to the fields of the "debris" and "drainage" inquiries, so called. At the end of that time, by another act of legislature, there were imposed on the state engineer the duties of planning and advising about large works of river improvement, and storage of debris. For somewhat more than a year these matters imperatively demanded close attention, when the last named law was declared by the supreme court to be unconstitutional, and thus terminated work under it. Hence, not until 1881 had more than half gone was the attention of the department centered on the irrigation examinations.

The difficulties and embarrassments under which the work of the department has been carried forward have been very great. There were the parties to three great contentions, in the midst of which was cast a technical department to make inquiry into the subjects of their bitterness. Peacemakers, arbitrators, and searchers after truth where extreme prevails, as a rule are trampled under before they have the opportunity to effect any part of their mission. The state engineering department has not been thus unceremoniously treated. But it has been very much embarrassed in the prosecution of its work by the uncertainty which there has ever been as to its continuance from year to year. It rested with the legislature at each session to provide means for the work. Each time there has been uncertainty. So that it has been impossible to organize the work and carry it forward to advantage.

Without particularizing at this point, it is within bounds to say that, could the department work have been planned at first with the certainty of six years existence, much better results would have been acquired by the use of very much less money. As it is, the work has been carried on spasmodically between legislative sessions, and each time stopped and disorganized, preparatory to a probable closing out. The demoralizing effects of such disturbance as it has had five times in seven years, in consequence of the contentions which have gone on over hydraulic mining debris, water-right, drainage, irrigation, and riparian right matters, can be appreciated only by those who have been through such an experience. It is not proposed to attempt a picturing of it here, however much the narrative would account for many shortcomings which may be apparent in the results.

Besides the unhappy influences incidental to the great legislative contentions, there has been much difference of opinion as to the sphere and proper purpose of the department. These matters will be explained in the introduction to that part (II) of the report which accounts for the field work of investigation. It is proper here to remark, however, that the department has always been sustained by majorities so great, in legislative action, as to amply justify the course which has been taken in its management, and that the treatment it has received at the hands of the press of the state, and citizens, generally, has been, to say the least, gratifying.

It is possible that the legislature did not appreciate the magni-

tude of the work which it outlined by the instructions above quoted. It is probable that the people of the state do not realize the importance of this subject. The field work is in the nature of a physical survey of the state, combined with certain industrial, social, and other inquiries of broad scope, and necessary to be prosecuted over a wide field. It is by no means complete, but enough has been done to warrant publication, to be submitted for legislative and popular judgment of its utility, and to serve as a basis for legislative action towards the interests involved.

The present report relates only to the irrigation part of the investigations. These have been distinctly in two lines, as "necessary for the proper and complete solution" of the questions with which the state has to deal. The investigation was not ordered for the purpose of furnishing plans for the irrigation of lands, except as this might be done incidentally to its main object. The intention was the acquirement of data upon which the state might formulate a policy and frame legislation respecting irrigation matters. This was the accepted purpose of the measure when proposed and adopted in legislature. It has been the main purpose for which the department has since been supported.

The report which is now presented should be primarily viewed in the light of its main purpose.

It is made in three parts. The first, introductory to a study of the problems of irrigation; and being itself a series of studies of irrigation development in the three countries of the world from whose experience we may hope to learn something for our immediate purpose, it is intended to serve as a book of reference for, and thus shorten the discussions that are to follow.

The second part presents the facts with respect to the field for irrigation: the past development, present condition, and possible future extension of irrigation in California.

The third is a discussion of the irrigation questions in California, upon the basis of the facts presented in the second part, the experiences in other countries reviewed in the first part, and in the light of other data which will be appended to the third part itself.

Under this general idea, the report is framed according to the following outline:

ADDITIONAL OPINIONS CONCERNING

"IRRIGATION DEVELOPMENT."

W. B. Trowbridge, Professor of Civil Engineering, School of Mines, Columbia College, New York.

"I regard it as one of the most interesting and valuable works that has ever been prepared on the subject. * * * It is impossible to examine it without being impressed with its thoroughness and its value for the purposes for which it was prepared. I know of no other which can take its place."

A. J. DuBois, Professor of Engineering, Sheffield Scientific School of Yale College.

"I can appreciate the labor of getting into such space such a mass of matter and the completeness with which the ground has been covered. As a full epitome of the subject it is the only thing accessible, and though you only ask for criticism and not for praise, I do not see how you can get the one without the other. I have no criticism for such work except praise."

E. A. Fuertes, Dean of the faculty of Civil Engineering, Cornell University, Ithica, New York.

"It is a splendid work. * * * The publication of a State document of such importance, demanding so large an amount of patient and intelligently directed labor, must be a just source of pride to California. And the foresight of the legislature of that State in taking the first successful step to codify the experience under foreign laws on the subject of irrigation, is worthy of imitation in many other directions by the legislatures of ~~other~~ other States."

OUTLINE OF THE
REPORT OF THE STATE ENGINEER OF CALIFORNIA.

IRRIGATION.

PART I.—*Irrigation Development.*

History, Customs, Laws, and Administrative Systems Relating to Waters, Water-Courses, and Irrigation in France, Italy, and Spain.

PART II.—*Irrigation in California.*

Water-sheds, Precipitation, and Water Supply—Lands Requiring Irrigation—Irrigation Districts—Water-rights—Riparian Interests—Works, Systems, Practice, and Statistics of Irrigation, in California.

PART III.—*The Irrigation Question.*

Development of this Question in California—The Mexican Civil Law—The English Common Law—The Californian Customs—The Conflicts—The Questions—Review of Irrigation and Water-Right Laws—A System for California.

The whole work is primarily intended as one of reference for the irrigators, land owners, members of legislature, and others who take a special interest in this subject as presented for state action in California, and is framed to meet a demand whose character has repeatedly been made apparent to the writer.

The legislature has ordered it printed and the copies offered for sale. If it meets with special favor, as a book to be read because of any motive of passing interest merely, at the hands of the general public, it will be successful in a line which has been subordinated to its leading purpose. Any demand which there may be for a report of that character, it is hoped will be met by a resumé of all the reports of this department.

A report which would undertake to show the irrigable resources of the state, as to lands and water supply, in sufficient detail to be of value other than simply to satisfy a passing interest and serve as a basis for general discussion, must necessarily itself be a large and by no means readable book.

A report which would undertake to present plans for availing of those resources, sufficiently matured to usefully show how the lands may be irrigated, would make up a small library. While the state has no system in its water-law, and no policy towards irrigation and water-courses but that of letting things drift, it were idle only to formulate special plans or general systems for irrigation works, or for the state to speculate as to how the lands

can best be irrigated; for each land owner or canal projector would, after all, do just as his interest dictated, and the probability is, as experience conclusively demonstrates, that the doing would not be in accordance with any well matured general system of works, or far seeing policy.

Indeed, it is a question, which the writer proposes to discuss in the proper part of this report, as to whether the state should ever undertake to mark out definite plans for irrigation works or systems. As to whether any policy which the state might adopt would admit of a useful purpose being served merely by such official formulations. Whether there is not about as much, as the people of the state will consent to undertake, to be done in establishing a system of law and administration, under which private and community enterprise can operate to advantage, and in collecting and publishing the data of physical phenomena, and the statistics of the use of water in irrigation, necessary on which to prevent or settle a large part of the conflicts of kinds continually arising in all irrigation countries.

The terms of the instructions in the law—about making plans for the best methods of watering the natural irrigation districts of the state—will be complied with, in writing this report. And, it is hoped, in a manner to render the compliance, when taken in connection with the other parts of the work, a valuable result. But such publication would never make an adequate return to the people of the state for the cost of the work, if the good to come were only through the use of the propositions in irrigation enterprises, for the reasons already given.

This department is in possession of much definite information which should be made available to every one, under a proper system. Moreover, a good treatise on the construction, maintenance, and operation of irrigation works in general, would be of inestimable value to very many people of the state, and by rendering enterprises more successful would amply return its cost to the state. But this report will not go into that field.

The introduction which will precede each part will more fully explain its plan, or immediate object, or furnish a key to its more important features. Other reports of the department now being printed, or in course of completion, and the maps prepared or in course of preparation for publication, will be spoken of in a memorandum at the close of the first volume of the main work.[1]

[1] See, pp. 607–9, hereof.

INTRODUCTION.

The present volume contains an outline of the history and a review of the water and irrigation customs, laws, and regulations of France, Italy, and Spain. As the common foundation of these, and a part of their history, the first chapter is devoted to the water laws of the Romans.

These are the countries where irrigation has developed under conditions such that we may expect to derive some useful lessons in public policy and private enterprise from its study.

The conditions which point to the utility of and necessity for this investigation are spoken of in the preface preceding. It is the object of this volume to present such accounts of these developments, with references to original authorities, as will enable a final study of the kind to be readily made.

The matter is not one to be summarily treated. It is one for close study, weighing many surrounding and antecedent circumstances. A mere abstract or a translation of the existing water and irrigation laws of the countries named would be of comparatively small value to our legislature and citizens: would, in fact, only lead to dispute in the halls of legislation, and find few readers amongst the people, as has already been, in part, shown by experience.

To be of utility in California, such investigation must go below the surface of present status. The subject must be studied in the light of history and surrounding circumstances.

Because France, Italy, and Spain may have water and irrigation laws, etc., apparently perfected for them by centuries of practice and amendment, we must not conclude that it were desirable, even, to introduce any one of their systems here.

Because we find in any one of such systems certain features which appear to us good, it must not be concluded that adoption in one of the named countries proves it the best for its locality, even. We should know how it came to be adopted.

We may learn many more negative than positive points from such a study. It is economical to learn what not to do, before doing it. California would be better off in this matter if some such lessons could have been imparted long ago.

On the other hand, we may learn, even from failures abroad, of measures which would prove successful here. And if we look closely to the matter we may be able to show good promise of their adaptability.

The writer has not overlooked the fact that the political, social, and legal forms and status of government, individuals, and property in California are not those of France, Italy, or Spain. An appreciation of this has been the impelling motive to try to look below the surface and back of the present times, in making investigation; and always with an useful object in view. In this spirit of thoroughness the data for the present volume has been gleaned, by private reading, and correspondence, and official search at times during the past nine years.

The book could have been much better written. The information could have been put in smaller compass without omission of anything material even to the immediate purposes of its compilation. These facts were known before it went to press.

By those who realize the necessity of thoroughness in the study for which it opens the door, and know of the circumstances under which it ought to be used to serve its purpose in California, the apparent fault of too great fullness of matter not immediately bearing on its subject will be condoned.

Those who will reflect upon the great mass of material from which its data has been drawn, held as it is almost entirely in foreign languages, and who know from experience the labor of selection, and how much must have been rejected to sift even as

closely as has been done, will overlook the presence of apparently redundant matter in this volume.

Those who are familiar with the extreme verbosity, diffuseness, and redundancy of style in which European state and law papers, and treatises are drawn, and reflect that these in thousands of pages were the models necessarily ever present with the writer hereof, will not be swift to criticise faults in composition and treatment of the subject which appear in this book. It takes time and labor to condense from the results of such a research as has been made, and the process has to be repeated to get the best outcome. Had the time for further revision have been at command this work would be more concise and probably more readable.

The primary purpose has not been to write a book for popular reading. Such a volume will fittingly follow the publication of the entire report. The formal systemization and subdivision of matter, and careful preservation of references to the more impor tant authorities, shows at once the intention of making this a volume for reference, as heretofore declared.

It is an epitome of a special literature and line of data which is, for the most part, inaccessible to all but a very few individuals of those for whom this work has been undertaken and is particularly intended. If there is an apparent attempt in the composition to render readable an avowedly cumbrous arrangement of the subject, it may be attributed to a pardonable desire to make the work more acceptable to the irrigators, land owners, and citizens of California, who, having it in their libraries, as a book of reference, will occasionally read a few of its chapters.

The detail of treatment has been a matter of thought. Opening the work at almost any page, the commencement of a subdivision of the subject is before the reader. It has been the endeavor to make each such little paper sufficiently complete to have its bearing fully understood without the necessity for familiarity with other pages.

This idea is in keeping with the general purpose of the work as one of reference, and is intended to fit it for the use of many persons who are not book readers, and who probably, from lack of time and force of habit, would not follow any report, work, or treatise through consecutively. The unavoidable result is repetition and consequent swelling of bulk; but the better purpose which the book will serve within its sphere should be ample excuse for this fault.

Let it be remembered that this compilation is a pioneer in its field. There was no model or guide for it. There is no other work in any language which essays the picturing of the development of the water and irrigation laws, customs, and regulations of the three countries named, or of any two of them, in a manner intended to serve as the basis of comparison, or as the foundation of study of their principles, from the standpoints of irrigation enterprise and state policy.

There are very many single and partial treatises touching on the subjects for the several countries, but these are almost wholly law books, or technical works on irrigation, or official publications, where is occasionally found something pertinent. In fact, the literature of the subject is immense, but the arrangement is in no instance to our purpose, so far as has been learned by a very diligent inquiry through commercial, official, and professional channels during the past eight years, and by the collection of many publications.

There has been no guide, even, of recent date, to a line of authorities on the subjects of this volume. The data of this work have been obtained to dates less than a year ago, in several instances, on the advice and through the courtesy of official sources. So that it contains much that is not elsewhere found in print except in governmental or European legal publications.

Above all, it must be remembered that, as it stands, this volume is not a complete report. Its points should be held as lights to the study of existing and possible irrigation in California, which

will be presented in the second volume. Its data will form a large part of the basis for discussion of our irrigation question, which will be essayed in the third volume.

Had this work to go before the public only through the channels ordinary for state reports, an explanation, such as the foregoing, would not be necessary or in good taste, but the fact that it is ordered to be placed on the market for sale has rendered some such introduction imperative to prevent thoughtless criticism by those who may not understand the circumstances of its production or the demand which has brought it into being.

For advice and other favors in immediate connection with this study and present volume, special acknowledgment is due to the late General B. S. Alexander, consulting engineer to this department in 1878, Honorable George P. Marsh, late United States Minister to Italy, and Honorable John Buchanan Hall, counselor at law, Stockton. The character and extent of these obligations will be shown, and acknowledgment made of substantial favors received from a number of other persons, in a memorandum at the close of the book.

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Acknowledgments of assistance and favors received, relating to the present volume p. 605.

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IRRIGATION DEVELOPMENT.

LEGISLATION AND ADMINISTRATION,

IN COUNTRIES UNDER THE CIVIL LAW.

FRANCE; ITALY; SPAIN.

IRRIGATION DEVELOPMENT.

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IRRIGATION LEGISLATION AND ADMINISTRATION.

ROMAN EMPIRE.

Roman Irrigation Legislation.

INTRODUCTION.

It may be said that Rome once ruled all the countries of Southern Europe, Northern Africa, and Western Asia where irrigation had its birth and its greatest development in ancient times;[1] and that her laws with respect to waters were crystallized several centuries after the Romans became familiar with the practice of irrigation and the necessities of the irrigation interest as at that time recognized in the various quarters of this region.[2]

Those who were regarded as authority at the law in Rome, who plucked from the confusion of her earlier customs and edicts the principles of her laws, with others who expounded those principles and formulated her system, were amongst the most acute and logical thinkers the world has known to this day; so that modern jurisprudence, at least in continental Europe, has been so far guided by the principles of the Roman Law, it has been said, in substance, that "having ceased to rule the world by their arms, the Romans still control mankind by their reason."

This being the case, it is well that our inquiry commence with a glance at the leading features of the laws and administrative policy of this people in their dealings with the water-right and irrigation interest, although, considering the vast difference in our social and political establishment and forms of business enterprise, we may not find the positive guide which we are in search of.

[1] Irrigation of course existed in some of these countries long before the Roman Empire was founded, and India and China also were the scenes of irrigation practice at a much earlier period.

[2] Rome was all powerful throughout the Mediterranean countries before the Christian era; but the Theodosian codes were promulgated more than four centuries, and the Justinian codes more than five centuries, later.

CHAPTER I.—THE ROMAN EMPIRE.

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SECTION I.

RIGHT OF PROPERTY IN WATER AND WATER-COURSES.

In their classification of things, as a basis of laws regarding ownership and use, the Roman jurists recognized, with respect to propertyship, two general classes:

Things *in patrimonio*, capable of being possessed by persons exclusively of others; and things *extra patrimonium*, those incapable of being so possessed.

Things *extra patrimonium* were classed under four headings:

Things common, free to all mankind; things public, belonging to some nation or people; things *universitatis*, belonging to some certain city, society, or corporation; and things *nullius*, belonging

to nobody; the latter relating to things consecrated and devoted to religious uses.

Common Property—Running Waters.

Like the air, water was regarded as a necessity to human life, of which every one might use so much as was wanted for personal requirements, but which was not capable of appropriation to private ownership further than in this sufficient quantity.

By the law of nature, flowing water is a common property of all men.—[Justinian's Codes, Lib. 6, Tit. 1, Sec. 1.

"*Res communes*, * * * things the property of no one in particular * * *—the air, running water, the sea and its coasts, and wild animals in a state of freedom. The air is necessary to human life, and every one may use so much of it as is requisite, but it is not capable of appropriation; the same is the case with running water."—[Colquhoun, § 923.

"*Res omnium communes.* Such things, it is obvious by their very nature, could not stand in private ownership. Every person might use and enjoy them, but no one could possess them. These things are the air, running water, etc. When the Romans speak of the air as a *res omnium communis*, they do not mean to include the space above the earth, but only the atmosphere. The man who owns the soil owns the space above it, and this space is a thing *in commercio*"—(capable of barter or sale); "but the atmosphere is a *res extra commercium*"—(a thing not capable of barter or sale). "The same remarks apply to running water. The space in which the brook or streamlet flows, as it hastens to feed the larger streams, is in private ownership, but the water is not."—[Gaius, p. 209.

"Things common to all, are those which being given by providence for general use cannot be reduced to the nature of property. Such are the air, running water, the sea, and the shores of the sea; but if a man by prescription, from time immemorial, had the use of running water, as for a mill, his case was an exception to the general rule, but he must not waste the water unnecessarily; and mills and other structures might be erected on rivers by special license. Vid. Digests, 48–8."—[Browne, Vol. I, p. 170.

"From the very nature of such things results the necessary consequence that they can never be completely the object of private ownership, that they can form the object of such a right only so far, and so long, as it is possible for man to retain them under his dominion or control. Except as to the portions which an individual may thus have brought under subjection, they must be regarded as common to all the world—*Res omnium communes.*"—[Goudsmit, p. 113.

Public Property—Rivers; Private Property—Brooks.

Streams, rivers, lakes, ponds, etc., which were not in private ownership, were regarded as public things, and spoken of as *res publicæ*, things which belonged to the people as a nation. There were public properties used for State purposes, solely and only, by the representatives of the State, the rulers or officials; and public properties used by private individuals, and yielding revenue to the State for such use; and there were public properties used freely by all the people.

"*Res publicæ*, in the strict sense of the words, are those things which are exclusively in the possession of the State. Such are public thoroughfares, public streams, public squares, public baths, and the amphitheatres."—[Gaius, p. 210.

The roads and rivers were specially counted as public things by the Romans. "The public could use the river, for instance, as a ship way, or for fishing, but the ownership itself was vested in the State."—[Gaius, p. 210.

They were not the property of the ruling sovereign, but of the sovereign power of the people collectively, each one of whom could use them as his own, but might not injure them, neither segregate any portion or constituent part of them for his own. And this right of use in the navigable rivers, highways, harbors, and gates, was extended to all, whether Roman citizens or not, who were at peace with Rome.

Public rivers are defined to be such as were perennial or ever flowing, as distinguished from winter torrents, but this, although one of the essentials of such rivers, was not alone sufficient to render them public, for if located through private lands they were not the property of the public unless navigable or capable of being made so by improvement, or, from some other cause, of public importance.

"It is not, however, all streams that are public things. Thus Ulpinius says: 'Some streams are public and some are not. Cassius defines a public river as one which runs perennially.' A perennial stream is one which flows throughout the year. Perennial brooks are not as such *res publicæ*, although, in consequence of their resemblance to public streams, legal protection was afforded to persons having only a private interest in them, which protection was based upon and analogous to that by which waters that were *res publicæ* (public) were protected. There was

not at any time in Roman law a strictly legal distinction drawn between the river (*flumen*) and the rill or brook (*rivus*). As a general thing, it may be said that the brook is a private thing, and the river the property of the public."—[Gaius, p. 209.

A river was distinguished from a stream by its greater volume, or more considerable local importance. Rivers were of permanent flow, or sometimes only of intermittent flow, leaving their beds dry in summer, when they were called torrents. A permanent river might occasionally dry up, however, without losing its character. Permanent rivers were public rivers, and might be either navigable or not navigable.[1]

River Banks and Beds—Ownership and Use.

The bank of a river, like the shore of the sea, commenced at the limit of the spread of the waters at high stage, but when lands were not inundated; land above that line was property in public or private ownership; all below that line was the bed of the river.

In the case of navigable rivers and all streams of the public property, the beds belonged to the state; being part of the public thing—the river. Should the waters leave such channel and take another, the river, the public thing, was considered to have moved, and the old bed became the property of those whose lands were taken for the new channel, while lands taken for this new channel became part of the public property—the river.

In the case of non-navigable rivers and streams not regarded as public, situated on private property, the beds belonged to the riparian proprietors. While these beds were covered with water it was considered that the rights of such proprietors were suspended, but such rights revived when the waters receded.

By some authorities, and at a different period of time, a somewhat different doctrine was held to, regarding the beds of rivers, which was as follows: The beds of rivers were classed with animals, birds, and bees in a wild state, fishes in public water, gems unfound, etc., things capable of private ownership, but yet within the power or possession of no one. When abandoned by the waters the lands of such beds became the property of the riparian proprietors, as did also alluvial formations in the beds of a stream—

[1] Justinian D., Lib. 43, Tit. 12, Sec. 1; Lib. 43, Tit. 12, Sec. 3.

whether in the form of addition to the banks, or islands in the channel—as soon as deposited.

"Temporary inundation suspends, and continued inundation destroys the right of the owner."—[Colquhoun, § 982.

It is not necessary for the purposes of this report to carry this subject further and consider the matter of alluvion.

The banks of a public river might belong to the riparian proprietor, to the extent that he had the right to take the fruits, cut the bushes, and fell the trees which grew thereon, but not so as to prejudice the use of the river or its banks by the public. The public had a right to the use of the banks of navigable rivers, so that a qualified ownership of the soil of such banks was all that could be acquired by private persons.[1] The owner of lands which were bounded by a ditch or wall following near the bank, or by a public road on the bank of a public stream, was not a riparian proprietor; to be such his lands had to be bounded by the stream itself.

Resumé as to Ownership.

We thus see, and it is essential to keep clearly in view, that the Roman law made a marked distinction between rivers and streams, and the waters thereof.

Taken as a whole, a river—channel and water—was regarded as a public thing *(res publica)*, the property of the state, necessarily excluded from private ownership or control, barter or sale, the use of which in its entirety, to be enjoyed by all.

But the water, regarded as a separate thing from the river, was the property of all the people in common—it was susceptible of apportionment amongst the people—each might drink of it, each dip up a portion and carry it away, and, further than that, if the enjoyment of the public property—the river as a whole—would not be impaired, each might divert a portion of the water from its natural channel for other purposes than those of his own domestic necessities. But the state, representing the people—the owner of the public thing, the river—was guardian of the common property, the water, and no person could use more than sufficient for his individual necessities and those of his family and cattle, without a special permit so to do.

[1] Colquhoun classes the banks of navigable rivers amongst things public, and says expressly that they were public property so far as the public chose to use them in aid of navigation.

Water-sources and some water-courses, it is true, were susceptible of private ownership, and, where thus held, the right to use their waters pertained primarily to such possessor. So, there were springs and brooks, which, being situated on private lands, constituted parts of the property, but the water itself, while running in its natural channel, beyond these lands, was the property of all the people, and, as such, was the ward of the nation.

SECTION II.

Control of Public Rivers and Waters.

It was specially declared to be lawful for every one to navigate his craft on all public rivers, lakes, and canals, and the banks thereof were open to all for purposes of loading and unloading, but the navigator was forbidden to enter forcibly upon a bank for this purpose. The right of fishery was open to all, and each person might dry his nets upon the shore, and otherwise use the banks as might be necessary in the prosecution of his calling. The banks and channels of public rivers were specially guarded from injury; the construction of works or the placing of obstructions therein, by the effect of which the current might be made more or less rapid, was forbidden.

The construction of works upon the bank, or in the channel of a public river, whether navigable or not, whereby either the low water or high water flow thereof would be affected, was forbidden. And works which might have an effect such as described, erected without authority, were removed or abolished at the expense of the constructer.

"Prohibitory interdicts forbade anything being done tending to impede the navigation of public rivers, or changing the course of running water; and other interdicts, of the restitutory class, compelled the reëstablishment of things in the way the public had hitherto enjoyed them."—[Ortolan–Mears, p. 398.

"The prætor says: 'I forbid any one to put any structure upon a river or on its banks, or to do anything that would deteriorate the navigation or the water-way.'"—[Justinian D., Lib. 43, Tit. 12, Sec. 1.

Speaking of this interdict, Colquhoun, in substance, says: And this applied to all public streams, whether navigable or not, in full force except in the case of works intended for the protection

or preservation of the banks or channel, the right to construct which works was the subject of a sanction.

"This interdict is intended for all people, and is perpetual, but 'lies against him only who has diverted the water, and his heirs prohibitorily and for restitution.'"—[Colquhoun, § 2291.

Construction and Maintenance of Works.

It was declared to be lawful, however, for riparian proprietors, or those who lived near the bank of a public river, to erect works for the protection of a bank thereof, provided that navigation was in no way impeded thereby, and that the river or the other bank was not injured.

"The prætor does not pretend to prevent all kinds of works made in rivers or their banks, but only those which could injure navigation or the water-way. Thus the interdict of which we speak here only concerns the public rivers, and not the others."—[Justinian D., Lib. 43, Tit. 12, Sec. 1, § 12.

If damage resulted from any such work, an official examination was made, and, if deemed necessary, the works were removed, or ordered changed, and security for ten years was exacted from their owner or constructor, the amount thereof to be assessed by persons chosen for their competency in such matters.

There was an interdict, *de ripa munienda*, concerning the protection of river banks, whereby it was lawful for riparian proprietors to construct works for the repair or protection of the bank adjacent to their property. If damage was threatened by such works to the lands of another on the opposite bank or elsewhere, a writ of inquiry was ordered, and a bond of security was exacted for ten years against the results of the possible damaging action, if, in the opinion of experts, it was likely to occur.

"This interdict being only prohibitory, and not also restitutory, had to be applied for before the work was commenced; for, afterwards, there was no mode of making it effective, and recourse had then to be had, in case of damage done, to an action for damages."—[Colquhoun, § 2292.

Diversion of Public Waters.

Appropriation of the waters of public streams, except for individual use, was a custom not known to the Roman law, for although irrigation was recognized as a necessity, the rivers were

regarded as a public property and as such were guarded in the common interest. Navigable rivers and running waters generally were excluded from private ownership because of the public use to which they were devoted and the common necessity for their use.

The diversion of waters, whether of floods or low-water flow, from public rivers, reservoirs, or tanks, without the sanction of a special privilege in each case, was prohibited. A decree of the prætor was required to obtain authority to appropriate to private use any material part of a property common to all the people.—[Ortolan, p. 143.

"Nothing prevents water being taken from a public river, unless the prince or the senate forbids; provided that this water may not be for public use. If the river is either navigable or makes another navigable, this will not be permitted."—[Justinian D., Lib. 43, Tit. 12, Sec. 2.

"The prætor must not accord the right of drawing from a navigable river a quantity of water whose extraction would injure navigation. It would be the same on a river which, not being itself navigable, discharged into another which it rendered navigable."—[Justinian D., Lib. 39, Tit. 3, Sec. 10, § 2.

"The matter of water, throughout the larger portion of the Roman empire, was a matter of great importance, and it was therefore found necessary to supply a summary remedy by interdict to all questions relating to it; hence it was provided in the edict: 'concerning annual water, it is not to be taken by force, fraud, or by the permission of another;' and 'concerning the use of summer water, it is not to be taken by force, fraud, or by the permission of another."—[Colquhoun, § 2301.

"By the civil law, the rivers were public; * * * nor was any obstruction or diversion of a river allowed. See Digest, Lib. 43."—[Browne, Vol. 1, p. 171.

[See, also, extracts from Ortolan and from Colquhoun, given under the second heading preceding this one.]

It appears that water privileges were of two kinds: *First*—Those, to individuals, of water for use on individual lands—the terms "on his farm" being used in this connection; and these were accorded by local authority, apparently that of the provincial prætors, at one period at least. *Second*—Those of waters for public use, which authorizations emanated from the senate or other supreme central power.

When a joint right to divert was issued to several persons the matter of division of the waters was left to those holding the right.

The remodeling or alteration of the headworks of canals or cuts out from both public and private rivers, without official sanction, was prohibited.

Use of Public Waters.

The use to which water was to be put was not always stipulated in grants, provided that it was to be used in good faith and not wasted. It was declared that the user of water was liable for damages, "by reason of anything done, dug, sown, delved, or built whereby the river was corrupted." It was declared that water privileges should be "exercised in such a manner as not to damage other persons having similar rights."

All interference with public springs or water sources, lakes, wells, and fish ponds, was prohibited.

"The waters of a public spring must be divided amongst the owners of the adjacent lands, in proportion to their possessions, unless some owner can prove his right to preference. But no one should be permitted to conduct the water on to his property unless it can be done without injury to the others."—[Justinian D., Lib. 8, Tit. 3, Sec. 17.

"A *caput aquæ* was a head or source of water, where it first begins to appear in whatsoever manner."

The cleansing of springs or fountains, etc., was permitted, but it was stipulated that no new veins of water were to be opened up.

Reservoirs might be cleaned and repaired, but no additional waters conducted into them without authority.

Possession and use of running water, as for the operation of a mill, or in irrigation, by a private individual, from time immemorial, gave a prescriptive right to the continued enjoyment of such use. No possessor of water, though having held it from immemorial time, had the right to use it wastefully to the prejudice of others.

SECTION III.

Control of Waters in Private Works.

Springs on private lands were the property of the land owner, on the principles that to such proprietor belonged all above and all below the land, and all it produced. The right to use spring waters might be acquired by others than the owner, by agree-

ment or prescription; prescription being use, virtually, from time immemorial.

Spring waters flowing off, joining with other waters and forming brooks on other lands, became common property of all people, but their use was dedicated primarily to the owners of the land along their course; so that such waters, for purposes of diversion, were held by these riparian proprietors, to the extent of their necessities. It is necessary to carefully guard against misconception on this point. Water rising out of the ground on a private estate, as being a part of the spring, was the property of the owner of the land; he could do with it as he chose; but when any portion of that water had escaped from the tract where it came to the surface, it became a common property of all the people. But so long as it remained in channels on private estates and channels not public from any cause (navigability or other reason), only the owners of the banks of its channel could divert it from its course and use it, except this right should have been acquired as a servitude, as will be explained under the next heading. But even these bank proprietors could not divert such waters, if, in doing so, other proprietors were injured thereby.

"For the validity of the concession for the right of taking water onto his property, it is necessary to have the consent, not only of those in whose lands the water rises, but, further, of those who have the use of this water, that is to say, of those who have a right of servitude upon this water. * * * And, in general, it is necessary to have the consent of all those who have a right upon the stream or upon the land where the water rises."—[Justinian D., Lib. 39, Tit. 3, Sec. 8.

Water drawn from its source, diverted, or drawn from its course, into an artificial and private channel, or when stored in a reservoir or tank itself in private ownership, became private property. The user might do with it as he chose, provided his use was in good faith—that he did not waste it.

SECTION IV.

The Right of Way to Conduct Water.

The rights to draw waters from a private spring or stream by others than its owner, and to conduct waters across lands owned by others, ranked as *servitudes.*

A *prædial servitude* under Roman law was a definite right of enjoyment in some particular respect, of one person's property by the owner of other adjoining or neighboring property. The land subject to the right was called *prædium serviens*, and the land to which the right was attached was called *prædium dominans*. Prædial servitudes related to estates in country or city, and hence were divided into *rural* and *urban*.

Such a servitude could be held only as an appurtenance to land owned, being called *prædial* because it could not exist without an estate. And the land subject to the servitude, and that to which the right of enjoyment was attached, had to adjoin each other, or be near to each other. The servitude was attached to the land having the right of its enjoyment, and was owned with it, and passed to a new owner with the title to it; but was extinguished when the two estates involved, became the property of one person: that person then acting by right of absolute ownership of all the property, and not as owner of one estate and the attached servitude on the other.

The right of passage across the lands of another, and the right of conducting water through such lands, appear to have been recognized as indispensable privileges from the earliest times of the Roman jurisprudence. The right of way to construct a canal or other conduit through the property of another, and to lead waters through it, was known as *servitus aquæ ductus*, and was one of the chief rural servitudes.

"*Servitus aquæ ductus*, the right to convey water by canals, bricked trenches, or pipes through another's land. Some aqueducts were public, but others were for the use of private farms, to which latter this servitude particularly applies."—[Colquhoun, § 938.

The right to take water through the property of another in a ditch or other conduit, could be acquired by prescription—use for a long period of years—or by agreement, or, in the case of public works or works of public importance, title to the land necessary could be acquired by expropriation and payment therefor. When acquired as a title, of course the right was complete. When, as a servitude, the right was acquired or accorded for a certain purpose only. Thus, he who had a prescriptive right to take any accustomed quantity of water across another's land, could not materially increase that quantity. Having taken the water for

his own use, he could not take water also in the same channel for the use of another. Having taken water for a certain farm, he could not take more than enough for that farm.

"The quantity of water that could be taken was determined, in the absence of agreement, by custom, not by the wants of the land for which the servitude was granted; but so much could not be taken as to starve the land from which it came. If custom sanctioned it, the water might be used for irrigation."—[Hunter, following Justinian's Code, p. 245.

"No one can, without permission of the prince, conduct water across public property."—[Justinian D., Lib. 39, Tit. 3, Sec. 18, § 1.

A right to draw and use water from another's spring or rivulet might be imposed by agreement or prescription as a servitude thereon. This right was known as *aquæ haustus* and implied also the right of passage as far as necessary to exercise the servitude.

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IRRIGATION LEGISLATION AND ADMINISTRATION.

FRANCE.

FRENCH IRRIGATION LEGISLATION.

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French Irrigation Legislation.

INTRODUCTION.

France is the country of Europe wherein we find irrigation practiced under the greatest variety of physical circumstances and at points widely separated; and where, in consequence, a very great diversity of interests exists and a wide range of practice has grown up.

The departments of the Mouths-of-the-Rhone and of Vaucluse, in southeastern France, where irrigation is most common, are in a region of wide open plains or rolling lands near to the level of the sea, where the temperature is high and rainfall very light, and artificial watering of all crops is an absolute necessity, even on the richest of soils.

In the department of the Pyrenees, in southwestern France, a peculiar irrigation of natural meadows and other vegetation is found in the mountain valleys high above the level of the sea, with distinctive meteorological surroundings; while along the base of these mountains irrigation is again found on extensive plains and rolling lands of moderate elevation and medium range of temperature and precipitation.

In the department of the Vosges in northeastern France is found that peculiar irrigation of meadow lands where water is used almost continuously, notwithstanding heavy rains well distributed throughout the year.

In northwestern France artificial watering has reclaimed and made productive and populous, vast tracts of land formerly barren and covered with drifting sands or scanty natural pasturage.

Throughout France market gardening and fruit raising is largely dependent upon irrigation, which is very extensively prac-

ticed for these purposes as well as for growing fodder and grazing plants and plants used in manufacturing textile fabrics and dye stuffs; and of late years the application of water on vineyards to drown out or prevent the spread of phylloxera has become quite common and is directly fostered by governmental aid in various ways.

Besides the very great variety of physical conditions and results surrounding and attending irrigation, we find in France an example of an attempted complete governmental control of irrigation and water-right matters, under a comparatively liberal form of government and amidst a free and enlightened people; and, attending this, somewhat complicated relations between the administrative and judicial arms of the government.

The government of France has of late years specially encouraged irrigation in a variety of ways, and here we find examples of irrigation enterprise both ancient and modern, and of all grades and forms of organization—from the small private ditch project to the large, costly, and complete canal systems wholly built and managed as public works of the nation.

Of these interesting and instructive lines for inquiry a great mass of data is available in print; so that of France a more complete view may be had of irrigation at this distance from its scene, than of any other European country, and its lessons are perhaps the most instructive.

CHAPTER II.—FRANCE[1];

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SECTION I.

ORIGIN OF PROPERTY RIGHTS AND OWNERSHIP OF STREAMS IN FRANCE.

Basis of Property Rights.[1]

While under the dominion of Rome all matters pertaining to the streams and waters of the country now called France were subject to governance by Roman law. Long before the close of the Roman rule, the people had the full protection due citizens of Rome, so that at the time of the conquest of Gaul by the Visigoths (A. D. 470 to 480) there was much land held in individual ownership with the consequent private rights on small streams; but under these Merovingian kings the freehold titles to land

[1] See, particularly, Dalloz, and Malapert; also, Dumont, and De Passy.

disappeared, property was held by a different tenure under the sovereigns, and all right of ownership in water-courses and waters was vested in the rulers themselves. The feudal system then grew up, and the water-courses, from having belonged, according to their class, to the nation and the people or to private individuals, under Roman law, and then exclusively to the kings, under Merovingian rule, became dependencies upon the fiefs of the feudal counts, who assumed almost complete ownership of and control over them (9th to 12th centuries).

Actuated by desire for the revenue to be had from tolls and subsidies for navigation and ferry or bridge permits, for several centuries a struggle was now ever present between these nobles and the kings, for the control of the water-courses; and the conflict did not cease until the government had become centralized and feudalism had been overthrown during the fourteenth century. "All streams and waters belong to the king by right of kingship" was the principle proclaimed by the sovereigns and their nearer adherents. But in contending for this principle against the nobles and provincial states, the kings in fact gave up control of non-navigable streams—those upon which tolls could not be collected for ferriage and navigation permits—to the bank-land owners.

In the fourteenth century the study of the Roman law was actively revived in France, and the time being about coincident with the decline of feudalism, and the Roman law, recognizing ownership of streams not of public importance—that is non-navigable streams—by the riparian proprietors, this rule apparently thus became incorporated into the law of France. The kings asserted their ownership of all navigable streams and those which were floatable for rafts and large timbers, extended the application of the rule as far as there was then any justification for it, and left the control and virtual ownership of non-navigable and non-raftable streams to the bank owners, but really without any formal laws or declarations upon which was grounded their claim of title to them.

The public possessions of the kings, held for the benefit of the nation, became in course of time known as the "public domain," and in 1566 was issued the edict of Moulines, which declared the imprescriptibility and inalienability of this public domain. This policy of holding fast to all the nation's property, though often

attacked, is still adhered to by the government, so that water-courses and waters, once declared navigable and raftable can never be alienated from the public domain, and become in any sense private property.

Ownership and Control of Navigable Streams.[1]

Navigability and floatability for rafts and large timbers became the test for streams belonging to the king, but any stream deemed of public importance might have been declared thus navigable or raftable, and made so in sufficient degree to justify its incorporation into the public domain.

The changes in the form of government, occurring a little less than a century ago, appear to have resulted in no completed action affecting the laws or customs respecting waters until 1803–4, when the Code Napoleon, the present civil code of the country, was promulgated. With respect to water-courses and waters it makes the following distinct announcement, which is its only direct statement relating to the ownership of water-courses or waters:

"Article 538. Highways, roads and streets at the national charge, rivers and streams which will carry floats, shores, ebb and flow of sea,[2] ports, harbors, roadsteads, and generally all portions of the national territory, which are not susceptible of private proprietorship, are considered as dependencies on the public domain."

A royal ordinance of 1835 enumerated all the streams and parts of streams in France, deemed navigable or raftable, and hence claimed as of the public domain, and other ordinances, etc., of later dates have added to the list. The sovereign authority to declare streams navigable, and thereby make them part of the public domain, has not been disputed either in the courts or before the council of state, but riparian proprietors who have been dispossessed of their right to water for irrigation, by the exercise of this power, have claimed, and been allowed by the courts, in a manner prescribed by law, indemnities for actual damage caused them.

Furthermore, although only certain streams and parts of

[1] See, particularly, Dumont, pp. 1–14, 135–146; Dalloz, Vol. XIX, p. 337; Proudhon, § 816; also, De Passy.

[2] These are the words of Richard's translation of "*lais et relais de la mer;*" but the phrase should be rendered "the land left uncovered by and recovered from the sea"—namely, the land newly made by the sea.—[Dalloz, Vol. XXXVIII, p. 208.

streams, embracing probably all that really are navigable, or that can be made so by a small amount of work, have been thus added to the public domain, the administration, in council of state, may at any time declare other streams or parts of streams navigable or raftable, and thus make them public property, afterwards paying the riparian proprietors for whatever actual damage they may suffer, as may be adjudged by the courts. The state, owning these water-courses, is, of course, owner of the waters forming them, and these, with the beds, under the edict of 1566, are inalienable from the public domain; their *use* only can be granted, as will hereafter be seen.[1]

Ownership and Control of Streams not Navigable nor Raftable.[2]

The ownership of the beds and waters of streams neither navigable nor floatable for timber, and not claimed as such by the government, is a point which has been much disputed. It is stated by some French writers of forty years ago that the beds of such streams belong to the riparian proprietors, and they imply that the waters are a sort of property held in common by these proprietors.

But all authoritative writers now hold that "according to the terms of article 714, civil code, water-courses not navigable nor raftable are common property, *i. e.*, enter into the class of things which do not belong to any one."—[De Passy, p. 297.

This article 714 reads as follows: "There are things which belong to no one, and the use whereof is common to all. The laws of police regulate the manner of enjoying such things." But the preceding article, 713, says that "Property which has no owner belongs to the nation." Taking these two articles together, if the ownership of non-navigable and non-raftable water-courses cannot be fixed elsewhere, then these streams belong to the nation, just as well as do those which have been made part of the public domain by declaration of navigability, under article 538.

The facts are, that riparian proprietors claim the ownership of the channel beds to the center line, each in front of his property, and that the courts allow the claim when the beds are permanently laid dry from any cause; that alluvial deposits along their

[1] De Passy, p. 297.

[2] See, particularly, Dumont, B. II, Chs. III and V; De Passy, Ch. I, and p. 279, *et seq.;* De Buffon, Vol. II, Sec. I; Dalloz, Vol. XIX, pp. 379-384; also, Code Napoleon.

banks accrue to the benefit of the land owner adjacent to whose field they form; that islands forming in the channels, belong to the adjacent bank owners, in proportion on each side to local circumstances, and that prior to the passage of a law specially to the point in 1847, the owner of one bank could not, even after having secured administrative authority to build a dam in the stream in front of his property, obtain the right to carry it past the center of the stream, or connect with the opposite bank, without the consent of the owner of that bank.

We see, therefore, that until very recent years the beds of streams of this class belonged to and were under the control of the riparian proprietors, except, as will be seen hereafter, in matters wherein the government had exercised a supervision of works and channels to insure a free flow for flood waters.

Riparian Claims to the Waters.[1]

The waters of non-navigable and non-raftable streams were formerly also claimed as the private property of the riparian proprietors. Circumstances of their origin and division, and the necessarily common control of the streams, upset this theory, however, long before the passage of the Code Napoleon. They were next claimed by these bank-land owners, as a sort of property held in common by them as riparian proprietors, for the exclusive benefit of their lands and industries.

On the other hand, it was and still is claimed by the owners of lands not bordering the streams, that these waters belong to the whole people of France, or are held by the nation for the benefit of the whole people; and while the riparian proprietors are given, by the Napoleonic code, a right to use them in irrigation and otherwise, they are not given an *exclusive* right, but that the government, as the guardian of the waters, can, as in the case of the waters of navigable streams it does, grant concessions for the use of some part of them on lands not riparian, so long as rights already accrued by use be not unduly or injuriously limited or their exercise inconvenienced by such action.

Replying to this, the riparian proprietors now say, that, if the waters belong to the whole people of France or to the nation, they, the bank owners, have, under the code, a special and com-

[1] See, particularly, Dumont, Dalloz, and De Passy; also, De Buffon; as last cited.

plete servitude on all such waters, which servitude, or right to use, is continuous and not forfeitable by failure on their part to avail themselves of it at any time, or for any length of time, except as between themselves, as will hereafter be shown.

The question of the ownership of these waters, and that of the nature of the right which riparian proprietors have to use them, are points of several centuries of litigation in France, for these questions were in dispute long before the civil code was promulgated, and it only changed the aspect of affairs and stirred litigation up again on a slightly different basis, with many fine points of law brought to the front.

The fact of the ownership of the waters of non-navigable and non-raftable streams by the nation, as representing the whole people, is now pretty well settled, and the tendency of decisions and administration rulings, is towards a declaration of ownership, by the nation, of the beds also, so long as occupied by the waters—or, so long as they are courses for public waters.

Starting several centuries ago, with almost complete ownership and control of the waters and channels of streams not navigable nor raftable, the riparian land owners have since been restricted in their rights, from time to time, and we now find them without any recognized claim of ownership in the waters, and only the semblance of ownership in the channel beds until after these shall have been laid dry; but with a preferred privilege to the use of the waters, as we will hereafter see.

SECTION II.

Water Laws and Regulations.

Moving Causes of Development.[1]

The water laws of France have their roots in the groundwork of principles governing the right of property in water-courses, which have already been spoken of; for the application of these principles, molded by the temper and the wisdom of the rulers, and mellowed by the customs of the people, has brought out the laws and administrative system which we now find. For centu-

[1] See, particularly, Malapert; also, De Buffon, and many papers, etc., in the *Annales des Ponts et Chaussées*, and Dalloz, as last cited.

ries agriculture has been the favorite pursuit of the French, and the rulers of the country have been alive to the importance of fostering it; while manufacturing, largely dependent on agriculture, has been its branch of industry next in importance.

Agriculture in many quarters of France has necessitated the application of water in irrigation; manufacturing has in a high degree been built up by the application of water for power, and has developed a necessity for the use of water in large quantities in very many industrial processes.

The necessity for cheap internal transportation facilities early developed a policy of river improvement and canal construction, so that, commencing in this way as far back as the tenth century, France now has a network of navigable waterways extending over almost the entire valley portion of her territory.

Her drainage systems and topography are such that large areas of country in the river valleys have been subject to occasional inundations, resulting in loss of property and in unsanitary conditions, producing fever epidemics, thus pressing upon the attention of the people and the government the necessity for improvement of arterial drainage lines, the embanking of lands, and the sanitary drainage of lands embanked and those otherwise subject to receiving too much water.

These things all combined, have brought about the making of laws, the growth of customs, and the promulgation of regulative decrees relating to the improvement and guarding of water-courses and waters, and their use in every way and in all interests.

Special Regard for Irrigation.[1]

Agriculture being a leading interest, and the country ever alive to its importance, although we find much complaint on the part of French hydraulic-agricultural writers, that more has not been done by government in behalf of irrigation, drainage, and the like, and although undoubtedly more could have been done to great advantage, in the way of systematizing matters as well as in the construction of works, yet, considering the political troubles which have for long periods of time disturbed France, on reading the accounts of and laws relating to her hydraulic agriculture, we, who may judge without prejudice, will be led to believe that the French rulers and governments generally have striven to en-

[1] See, Dumont, and De Buffon.

courage and develop irrigation, drainage, and reclamation, and, in fact, have accomplished much for them. We find irrigation constantly favored in the laws, in preference to manufacturing and many other uses of water: domestic necessities and navigation, alone, ranking it in the scale, and the first of these two uses being the only one decidedly preferred to it in the administration of the laws.

The French laws respecting irrigation are about as liberal as they could be made under the circumstances surrounding their development or formation. And it is a significant fact that, although framed for the most part in the midst of monarchial surroundings, amidst all the tearing to pieces which the institutions of France have repeatedly had by the liberalizing spirit that has from time to time prevailed, and even now that the country for a decade has had a republican form of government, the old administrative ordinances, the old administrative system, still prevail almost unchanged, except in details and developments that in no way affect their leading principles.

Classification of Water Laws.[1]

The earlier laws of those which now exist are the edicts of kings, from the sixteenth to the present century. Then come, in addition to similar promulgations, the decrees of ministerial officers, enactments of legislative assemblies, opinions of superior administrative authorities, as well as decisions of courts.

In fact, besides the statutory law, which is king-made law and that emanating from legislative officers or bodies, the water laws of France comprise two branches of what answers closely to our Common law, in the method of their development—namely: through the interpretation of law and the establishing of precedent by decisions. These branches of the water laws have grown, respectively, from the decisions of courts, and from the decisions or rulings of superior officers or bodies of the advisory and executive branches of the administration.

Although on several occasions within the past century, and notably within the last ten years, efforts have been made to bring into form and within a code of small compass the water laws and regulations of France, there is still no general and comprehensive

[1] See, Dumont, De Passy, and *Les Annales des Ponts et Chaussées*, Vols. Laws and Decrees.

law or code on the subject, but the system is made up of numberless edicts, ordinances, acts, decrees, rulings, decisions, instructions, and circulars, which form a body of law and regulative rules quite difficult to trace through in its connections and bearings.

SECTION III.

The Administration.[1]

Water-courses and waters in France have been from an early period in the modern organized government succeeding the feudal system, generally subjected, not only to laws made by the law-making power of the land and interpreted by the courts, and to regulations made by the executive branch of government, but also to an active and constant supervision by the officers of an organization within this executive branch. This arm of the government is called *the administration*. Its regulative measures appear under the titles of decrees, instructions, regulations, administrative laws, etc. Its purpose, according to the French water-law writers, is to supply the deficiency which must ever exist in the application of general laws and principles to the management of the affairs of water-courses through the medium of courts: a deficiency which makes itself apparent in the impossibility of fully utilizing streams and waters under any system of primal principles rigidly adhered to under all circumstances throughout a country.

From the difference in the nature of property rights on streams of the two classes—those navigable or raftable and those not so—and from the great difference in the interests to be conserved upon them, result the very essential differences in the administrative policy and measures to which they are subjected.

On non-navigable and non-raftable streams the administration, in theory, interferes with private operations conducted by those who as bank owners have rights on the streams under the ancient usages and the civil code, primarily, to regulate works in the channels or on the banks, with the view of preserving the channels in the interest of the public, and as far as possible assuring or developing a free passage for flood waters without

[1] See, particularly, De Passy; also, Dumont, and De Buffon.

augmenting danger of floods; and, secondarily, with the view of preserving the interests of navigation on the main stream below.

On the water-courses of the public domain—those declared navigable or raftable—the policy of the government is actuated, primarily, by a solicitude for the interests of navigation, and then by an almost equal interest in promoting the economical and full use of the waters in agriculture, manufacturing, and industrial pursuits generally, and, finally, none the less, by a realization of the pressing necessity for promoting the arterial drainage of the country, in order that great floods be prevented, that valuable lands be reclaimed to rich taxable districts, and that insalubrious swamps be reclaimed to healthful neighborhoods.

Administrative Purpose and Policy.

On non-navigable and non-raftable water-courses the administration is not authorized to interfere between the owners of works already constructed and those proposed or newly constructed. If a proprietor has lands bordering on the stream, the administration is bound to presume that he has the right to water from it, and it can only interfere in an authoritative way with his project, to the extent of regulating his works, with the views set forth in the second paragraph above. Further than this, in these cases, the administrative engineers can advise the parties at interest, and bring before them all the facts as to measure of water supply, and extent of use, and nature of existing irrigations, or other data from which to judge of the equities in each case; but if on such showings, amicable agreements can not be arrived at, the administration has no alternative but to sanction the construction of any new work proposed—provided the work itself is unobjectionable—and thus leave the courts to decide, on the showing of facts, whether or not the new diverter is entitled to water.

On navigable and raftable streams, the administration is invested with full powers, not only to regulate works of all kinds, and much more in detail than on non-navigable and non-raftable streams, but, also, to consider all questions relating to water privileges, to issue and restrict them at will, under the laws.

In the case of both classes of streams, the administrative engineers are charged with the duty of collecting and arranging the data respecting the supply and use of waters, so necessary in an equitable and business-like adjustment of the many questions

which arise between the various parties immediately at interest, and between these and the interest of the public, and also so essential to the study of economy and efficiency in use of water, and the full development of the industries dependent on it.

Thus, the administration on non-navigable streams regulates only the works, and the courts adjudge the rights, while on navigable streams the administration adjusts and decides all questions, and issues all privileges, and, finally, on all classes of streams, it obtains the data from which to judge of questions which come up. This much for the scope of power, policy, and duties of the administration as affected by the classification of streams and interests at stake.

Government Organization.[1]

France has an area of 204,091 square miles—a territory only about one eighth larger than the State of California. The country is divided into 87 departments, these into 362 arrondissements, or sub-departments, these into 2,863 cantons, or judicial districts, and these, finally, into 36,056 communes, or municipalities.

France is a republic, but very many of her institutions are monarchial by origin and in spirit. The legislative power is vested in two houses, or chambers—the chamber of deputies, and the senate; and the executive authority, in a president. The chamber of deputies is elected by universal suffrage, each arrondissement being represented by one deputy, or by more if its population exceeds 100,000 souls. The senate is composed of 300 members, of whom one fourth are elected by the senate itself, for life, and three fourths are elected for nine years by electoral colleges formed in every department and commune.

The president is elected by the senate and the chamber, sitting conjointly, for seven years. The president promulgates the laws voted by the chamber; and he appoints his ministers, who are responsible to the chambers for the conduct of their several bureaus. A council of state, presided over by the minister of justice, and consisting of thirty-seven councilors and twenty-four masters of requests, nominated by the president, and thirty auditors, nominated concurrently with the senate, advises on laws referred to it by the chambers or by the ministers, and on all matters submitted by the president, performing in this way certain duties as the chief advisory and regulative body to the bureau which has

[1] See, particularly, Reclus, Vol. II, Ch. XV; also, Malapert, Ch. XXI.

to do with the administration of the affairs of water-courses and waters.

Each department has its general council, the members of which (usually one for each canton) are elected by universal suffrage, for six years. These councils meet annually to discuss the department budget and to act as advisers of the prefect. The prefect is appointed by the president, on nomination by the minister of the interior. He is virtually the governor of the department, and his powers are extensive. Each arrondissement, or sub-department, has its sub-prefect, and a council elected by universal suffrage, to consider and regulate purely local matters. The cantons are merely judicial and electoral districts. Each commune has a municipal council of from twelve to eighty members, elected by universal suffrage. The mayor of the commune is appointed by government, but he must be a member of the elected municipal council. He represents the state as well as the commune.

The Administrative System.[1]

As will be seen, the mayors and municipal councils, the sub-prefects and sub-prefectorial councils, the prefects and the prefectorial or general councils of the departments, as well as the council of state of the government, are all connected with, and in fact together, make up the administrative department, which, with the engineering corps and bureau of public works, control the affairs of water-courses and inland waters of the country.

The mayors and the prefects are the principal administrative units in this administrative system, and to give an idea of the scope of their territorial authority, it may be remarked that the average commune is 5.5 square miles, and the average department is 2,345 square miles in area. This makes the jurisdiction of a mayor cover territory less than one sixth of a township of our land survey system, and shows the average scope of country presided over by prefects to be about the size of Colusa, or one half that of Los Angeles county, in this state.

The Bureau of Public Works.[2]

The construction and management of all public works, except those specially and fittingly confided to the minister of war, of the

[1] See, De Passy, Malapert, and Reclus.
[2] See, particularly, Malapert, Ch. XXI, and elsewhere; also, De Passy.

navy, of education, of posts and telegraphs, and some others, is delegated to the secretary of state or minister of public works. Amongst the duties confided to this authority are all relating to the hydraulic service, to ports, harbors, coasts, rivers, streams, canals, torrents, irrigation, drainage, reclamation, and the like. The care of all waters and water-courses, whether of the public domain or not, their control, and the control of the acts of individuals on their banks, is regarded as of public concern, and the administration has to do with the affairs of all streams, in a greater or less degree, as will hereafter be seen.

The minister of public works is the chief executive officer of government in this branch of the organization. He acts under authority of laws of the country, and in the light of opinions or interpretations of old laws and customs, by the council of state. And he himself makes rulings and regulations in conformity with principles thus laid down, in his circulars and instructions to subordinates.

For this purpose of administration, the prefects, each in his department, are the chief local executive officers under the minister of public works. In the management of the affairs of the streams, in all, except the planning and superintendence of work, and the experting of all questions of a technical nature connected with the subject, the prefects act under authority, and in accordance with the ministerial circulars and instructions, which communicate to them the results of, or the texts of, the advices of the council of state, when such there be.

Thus, all applications for permits or authorizations, or executive rulings, or enforcement of regulations, first come to the prefects, and they, if endowed with the authority suited to the case, act on it, or refer it with comments to the minister of public works if not competent to decide themselves.

The Engineering Department.[1]

In the ministry of public works is a corps of civil engineers, known, from long ago, for reasons not necessary here to explain, as the department of *Bridges and Highways.* This corps is a very extensive organization of men scientifically and practically educated at a government school for the purpose. Their mission

[1] See, particularly, Malapert, Ch. XXI, and the heading "Engineers" in preceding chapters; also, De Passy, supplement.

is civil engineering, primarily, and not military engineering or the art of war. The organization is somewhat that of the officers of an army, but promotion is not altogether by seniority, for competency and special fitness have much to do with this. From this corps, engineers are detached to other service—to the department of war, to that of agriculture, to that of posts and telegraphs, to the service of cities, and on special works, etc.

The greater portion of the engineers of bridges and highways are in the immediate service of the ministry, or bureau, of public works, in the construction or management of public works, or the supervision of private works or operations affecting the public domain, or the common welfare of all the people. While others of these engineers are in the service of the departments, and more directly charged with advising the prefects and prefectorial councils. Wherever they go, however, their plans of works proposed are subject to revision by the central commissions of the corps, and all technical matters of great importance are referred to the engineer-in-chief, to be by him laid before the proper revising board.

Besides the engineers, there is a corps of "conductors," who are the superintendents of works. These men, besides a certain theoretical training, have a practical education as constructors—stone and brick masons, carpenters, and builders of all kinds—and each one is a master in certain branches of practical construction. They report to the engineers, and carry out their plans and specifications. The conductors are graded, and have various ranks in their corps; and after a certain service become also advisers and inspectors of works.

The engineers are the executive officers of the minister of public works, in carrying out all works of a distinctively public character, and also in the preliminary examinations for, supervision of, and reporting on all private or other works affecting the public domain or the common good. And they are the advisers of the prefects in the regulation of matters pertaining to waters and water-courses, as well as other things. The management of works of navigation, such as locks, dams, etc., on canalized or improved rivers, and of public canals of navigation, and of works for the diversion of waters from streams, is intrusted to their charge. In a measure they have a co-jurisdiction with the prefects in some matters of police of streams, and the line of

duty of each is the subject of careful designation by ministerial decrees and instructions. Of the duty and authority of engineers and prefects more will be seen in the chapters which follow.

Administrative Working.[1]

Briefly reviewing that which has been said applicable under this heading, we see that the administration of waters and watercourses is confided to the minister of public works and his subordinates of the engineering and executive corps in the hydraulic service, and to the prefects of the departments, who, acting independently in some things, are still wholly dependent on the minister in others. Thus, in matters pertaining to the construction of any particular or important work, or the granting of any water privilege on navigable streams, the prefects can only act provisionally, and every case has to be considered by the minister of public works, and advised upon by the council of state. In matters of simply carrying out resolutions and the minor works of repairs or construction on this class of streams, the prefects have authority to act without reference to the central administration, but an appeal may always be taken by parties at interest to the minister or council of state, from an order or ruling of a prefect.

On streams not of the public domain, prefects have authority to grant privileges for the construction of all works, when they are duly advised by the engineers that no harm will be done by them and that the plans are commensurate with the purpose in view. And so, on this class of streams, the prefects are intrusted with the administration of all regulations, and the making of regulations for matters of detail in carrying out the decrees of the central administration and the decisions of the courts. The prefects of the departments, in performing executive duties, act through the sub-prefects of the arrondissements composing their departments, these through the mayors of the communes composing their arrondissements, and these through the river-guards and rural police of the country.

The government civil engineers form almost a distinct line of executive officers, as directly accountable to the central administration as are the prefects. Those who are assigned to duty as departmental engineers are, of course, annexed, as it were, to the

[1] See, particularly, De Passy; also, Dumont, and Malapert.

staff of the prefect in each instance, but those not thus assigned are in no way accountable to the prefects, except as they may be placed to advise on works or measures with which the prefects may have to do. The navigable streams and navigation canals of the country are under the supervision of engineers, the duty being apportioned so that one engineer is in general charge of a whole work or system, and all others connected therewith are accountable to him. The engineers on this duty act through their local assistants, and these through the guards of navigation, hereafter to be spoken of. The departmental engineers have to do more particularly with the non-navigable streams, and are in this line of duty the advisers of the prefects, and, in the absence of engineers specially in charge of any navigable stream, the departmental engineer is the adviser.

Thus, on navigable streams, in matters of management and maintenance, the engineers are really the executive officers and the advisers of the central administration, while on non-navigable streams the prefects are the executive officers, and the departmental engineers advise them. In matters of permits and privileges, the prefects are the executive officers on both classes of streams, and the engineers the advisers. In matters of construction, the engineers have exclusive control on navigable streams, and are the supervisory officers of private works on non-navigable streams.

Navigation and River-Guards.[1]

It is now the intention of the government, that all water-courses of public importance in France, whether navigable or raftable (and, consequently, of the public domain) or not floatable even for rafts, and timber, but which (by reason of the use of their waters in irrigation, or for power, industrial, municipal, or other purposes, or by reason of the existence of levees on their banks, or of their channels being outfall drains for populous districts, or by reason of their being tributaries to navigable streams where water supply is scarce) are of public utility, or liable to receive injury to their channels or banks, or to do injury by the excess or failure of their waters, shall be subject to the supervising care of special agents of the government, called *guards*.

On navigable streams these agents are called "guards of navi-

[1] See, particularly, De Passy, and De Buffon, pp. 98–106, and elsewhere; also, Malapert.

gation;" are appointed by the administrative officers in general charge of the construction, maintenance, and operation of the works of navigation, under the direction of the minister of public works, and are paid by government. The "guards of navigation" have charge of the operation of all locks, movable dams, sluices, and other structures in the river channels, and of all gates, sluices, or other openings for diverting water through the banks. They in fact perform the duties on rivers, similar to those performed by a superintendent and his assistants on a canal in his charge. At the principal structures, such as locks and movable dams, guards are of necessity stationed all the time, while others are assigned to beats on the river along the intermediate reaches.

Every river being subject to general regulations laid down by the central administration, and to special regulations covering details and laid down by the local administrative and engineering authorities, it is the province of the guards to see that these are observed and not infringed upon; to see that all who have water privileges get their dues according to the schedule, and are not curtailed in their enjoyment of them by the greed, carelessness, or ill-feeling of others; to see that neither by neglect nor criminal act, is anything done to injure the bed, channel, or banks of the streams; to observe all works connected with navigation or affecting the stream in any way injuriously, and to report their condition; to prevent the deposit of filth, rubbish, or dirt in the channel or on its banks; to keep a record of the flow of the waters, and of their height at different points; and also to render assistance, in cases of necessity, to river-craft crews or others endangered or embarrassed from any cause.

Some rivers are specially under the charge of engineers detailed from the government civil engineering corps for the duty; and in these cases the guards report to them and receive instruction from them. In cases where the navigation is not thus exclusively under engineering control, the guards are subordinated to some other governmental functionary having these interests in charge, perhaps, in the several localities.

River Guards—Their Duties and Compensation.[1]

On non-navigable streams, the guards are called "river-guards." They are appointed by the prefect of the province, generally on

[1] References, same as those for preceding heading.

the recommendation of the riparian owners, and others interested on the stream, and are paid by the prefect, with moneys collected from the parties at interest on the stream, according to circumstances.

On streams where waters are used largely for power purposes, and which are not embanked, or, from other cause, threaten riparian lands, the tax for the salary of the river-guards is levied entirely on the manufacturing interest using the water, or, if at all, in a small degree only, on the owners of riparian lands. While on streams embanked, and threatening overflow of adjacent lands, and on streams used as drains for riparian properties to a considerable extent, in the absence of manufacturing interests, the salaries of the guards are assessed wholly on the riparian proprietors.

Still again, on streams whose waters are used in irrigation, to the exclusion of other uses, and where there is no special reason, as first above mentioned, for calling on riparian proprietors not thus using water, the salaries of the guards are assessed chiefly upon those who divert the water, and the riparian proprietors not diverting water, pay but a small portion. These rulings are the outgrowth of custom, and while they are very generally accepted without opposition, they have met, and still do meet, in some cases and localities, with very strong opposition from those who have to pay.

On these non-navigable nor raftable streams, the river-guard is a supervisor of maintenance of works, and a police inspector to report the condition of the streams, banks, and channels, and to report all acts in contravention of the general laws and special regulations applicable to the river, or part of river, placed in his charge. He is assigned a regular beat, over which he has to go at stated intervals, examining everything pertinent to his charge, keeping a minutely detailed journal of his operations, and reporting to officers, designated in each case, at different parts of his district. The following is a formula for duty for river-guards used in the regulations in the department of *Seine-et-Oise:*

"A river-guard is specially charged with seeing that the present regulation is observed; that the execution of the works of cleansing the channels, remodeling and protecting the banks, cutting away undergrowth where harmful, mowing the tall grass or rushes on the banks, etc., are carried out according to the orders of the syndicate and of the engineer of the district, and under the sur-

veillance of the mayors of the communes traversed by the water-course that is the subject of this regulation.

"The river-guard must report all infringements whatsoever of regulations committed by manufacturers, riparian owners, or any other person. He must visit once a week all parts of the river intrusted to his superintendence, and prove the fulfillment of his duty by the signature of the local officers in the various parts of his district, to whom he reports.

"He must keep a daily register numbered and indexed by some proper superior officer, in which he inscribes every day a report of all the facts that come to his knowledge on his tour of inspection, and particularly all infringements of regulations, or offenses that come under his observation.

"Once a week at least he reports to the chief officer of the district, to whom he is accountable, or to some other specially delegated authority, to give a verbal account of all that he has seen, and to have his register examined and countersigned."—[De Buffon, Vol. II, p. 102.

The Necessity for River-Guards.[1]

The necessity for river-guards is generally dwelt upon by writers on the subject of water-courses in France. De Buffon, perhaps the most authoritative author on the general subject of hydraulic agriculture and the management of water-courses in various countries, who has ever written, says on this point:

"Every day experience shows that the operations necessary for the preservation of stream channels, would soon be without useful results if they were not kept under strict surveillance by agents beyond the power of local control. Worse than all, the works of maintenance and repairs of structures so necessary to insure security of property from overflow would not be executed were the proprietors not closely watched. According to this double motive, wherever the utility of these works has become well understood, those interested have recognized that the influence of a special general agent is indispensable to insure the measures of construction and police in question."

And in another place this author says:

"This principle is admitted by every one who in the least understands the matter, that water-courses not a part of the public domain are, in the absence of governmental control, really in a state of abandonment, that seems to call forth on the part of riparian owners manifold offenses against the common welfare, and usurpations of all kinds. The first consequence of this

[1] See, De Passy, Malapert, Dumont, and De Buffon.

state of things, deplored by everybody, is the enormous damage thus caused to agriculture, increasing daily, and so occasioning losses whose amount in coin, if it could be calculated, would be a frightful sum; lessening the agricultural wealth of the country, wherever this interest in the streams has for any length of time been neglected."—[De Buffon, Vol. II, p. 133.

This damage is depicted as arising from injury to stream channels by want of care and neglect, or the deposit of materials so as to cause the filling of the channels over long courses, and the consequent overflow of lands, or the supersaturation of soils with moisture from the effects of bad drainage. And the author then says:

"We could cite localities, rich and flourishing in years gone by, where to-day agriculture is nearly annihilated, under the weight of calamities which were preventable by proper guarding of the small streams. Far are we from exaggerating the real situation to attract attention to the subject we are occupied with, for it is easy to assure everybody of its truth, or, to say it better, it is a truth too well known, for everybody can prove it by investigations in many localities, by the weight of the mournful words: 'We average a crop in but two years out of five.'"—[De Buffon, Vol. II, p. 134.

"The indispensability of river-guards must be considered as having been completely demonstrated by experience. The practice of riparian owners and manufacturers making encroachments on the channels of water-courses has, in every instance, developed where there has been no inspection, or where the agents had too extended beats and could not attend properly to their duties. But where guards have been in almost daily communication with the users of the water-courses, regulations have been observed and infringements prevented. An infringement taken at the commencement is generally discontinued on receiving a friendly notice, while suits entered afterwards are often uncertain in their results."

These words were written in 1856, when the hydraulic service of the country was not nearly as well organized or extended, nor the regulations so strictly enforced as they are now; and it is considered that De Buffon contributed more than any other person to the general understanding and popular appreciation of the subject at large, and thus did much to forward measures of reform which have since followed. The sentiment actuating these measures, and the principle on which they rest, are aptly set forth by the following paragraph from the same work, written in the discus-

sion of the habit of encroachment upon and interference with stream channels and banks by riparian land owners:

"Water has, on riparian properties, a natural, primordial right—the right to a sufficient and proper channel in which to pass. * * * River waters are, then, from time immemorial, in possession of canals carved out of the surface of the earth, in dimensions proportioned to the quantity of the flow to be carried. This is possession on the part of the state. The existence of these canals, as old as the world, is a title in the state, inscribed in the ground by the hand of God for the common good. Consequently it is a sound conclusion that public authority should have the right, and that it should be its duty, to have them respected and not tampered with by every dweller on their banks."—[De Buffon, Vol. II, p. 148, etc.

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CHAPTER III.—FRANCE[2];

WATER PRIVILEGES AND THE ADMINISTRATION OF NAVIGABLE AND RAFTABLE STREAMS.

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SECTION I.

WATER PRIVILEGES.

The Uses to which Water is Put, and the Regulation of its Use.

Water is extensively used from streams in France for irrigation, the production of power for manufacturing, for consumption in industrial processes, for domestic, sanitary, and other municipal purposes; and these four uses will be referred to herein as "irrigation," "manufacturing," "industrial works," and "municipal uses." As opposed to these industries and necessities which generally require the water to be taken from the streams and in

great part not returned, the interest of navigation, the general sanitary condition of the stream channels and consequent healthfulness of their neighborhoods, the convenience, comfort, and sometimes the necessities of riparian land owners, and the gratification of the people generally, demand that the water be left in the streams. And while thus there is a serious clashing between the two sets of opposing interests, those who demand the water out of the streams are by no means in harmony, but amongst themselves are most often brought face to face by conflicts of interest.

The government owns, controls, and in a business-like way, administers the affairs of all water-courses deemed navigable or floatable for rafts, or large timber, fostering the interests dependent on the use or presence of the water, and striving to insure the most complete, widespread, and well distributed good results to the people and the nation from the use of their properties. To this end, these streams have been studied so that their channels are well mapped out, their flow at different seasons of the year known, the requirements of the various industries well considered, and every work affecting the river's flow, or intended for drawing water from it, is measured and registered, and its rights or necessities, understood. There are very many old water-rights on these streams dating back several centuries; some even previous to the issuing of the edict of Moulines in 1566, but even towards these the administration has power to act as may best conserve the interests of the public and preserve the equities which attach to the private interests involved.

The Object of Administration.[1]

Interference is not the object of this systemization, nor is it the practice to needlessly exercise surveillance or management of the use of water. The object is to protect each general and individual interest against the general and naturally unavoidable antagonism of each other interest, and to administer a common property, which, by the nature of things, could not by any possibility be administered in a business-like way by any other than a governing power of some kind. Accordingly, no work of any sort, kind, or description may be erected upon a navigable river or a stream floatable for rafts, or timber, or one declared so, in France (indeed,

[1] See, De Passy, Dumont, and De Buffon.

the rule in this regard is not much less strict for streams not navigable nor raftable, as well), nor can any water be taken from such streams, except it be taken in a bucket or other similar hand vessel, without the project for which it is required, the plan by which it is to be constructed, if a work, or used, if a water privilege, has been first submitted to the administrative authorities, and publicly made known, criticised, and opposed if other interests are threatened.

All interests are put on their guard, all sayings in opposition are heard, all criticisms listened to. The project is examined by those knowing well the facts bearing on the whole case, and competent to judge of the tendency of such facts and their probable results; and permits are issued or refused after the whole case has been viewed with all the care and intelligent consideration which its importance will justify in each instance. Older rights and those of industries most needful are always protected in the administration of affairs from day to day; but no right is so old or no use so pressing that its owners have the power to control the division of the people's water, or use it in a manner wasteful or inefficient, or in any way unnecessarily hamper or hinder the full development and prosperity of other institutions dependent on water supply.

This is the object and purpose of the French administration of waters. It cannot be claimed to be perfect, either in theory or practice. That it is the best devised and in use, befitting application amongst a free and enlightened people, there can be no doubt. But it is not the best that can be devised for freer, equally enlightened, and more progressive people. Nevertheless its main principles are to be noted, and the general ideas of settled and registered privileges, and intelligent administration of the element common to their beneficial exercise, is to be kept in view and incorporated in any system which will assure freedom from clashing, immunity from litigation, and a full measure of benefit from the opportunities presented.

Rivers and River Works in France.[1]

France has a very much extended and intricate system of watercourses, several of which are large rivers naturally navigable for

[1] See, Reclus, Debauve (Vol. XIX), Malapert, and De Passy.

long distances from the sea. Rising amidst the snows and glaciers of the high Alps, or on the rain drenched face of the Pyrenees, or in the forest covered and heavily watered Vosges, or upon the rolling and wooded plateau of central France, these rivers are generally well supplied with water, and are sometimes subject to great and devastating floods. The destructive operations of man and his grazing animals on the mountains, the industrious tillage and soil loosening on the rolling grounds, the wasteful and criminally stupid action of municipalities in the disposal of filth by depositing in river channels, and others of the nature-consuming influences which have unfortunately accompanied the development of civilization, long ago forced the attention of the French government to river maintenance and improvement as a national necessity. So that river works, commenced as purely commercial ventures and enterprises by private individuals and companies and by the government in the centuries that have passed, have been added to in great number and spread out in class and character and locality, over nearly the whole country, by the influence of necessity in preventing harm, as well as that of enterprise in promoting the development of the country.

The lower and larger rivers and those of light slope in alluvial formations have, as a class, been improved by systematic embanking, training of currents, and dredging, and the higher rivers of greater grade slopes, been made navigable by dams in series, retaining the waters, at times of ordinary and low supply, in approximately level reaches from one to the other, or lessening the grades at those parts of their courses where the natural slopes of the beds were too great to admit of a navigable depth with the supply at command, and with a moderate current in the waters. These succeeding reaches or levels are, of course, connected at the dams by means of water locks for the passage of boats, and the dams themselves in very many instances are partly removable along their crests, sometimes automatically by the rising waters, and sometimes by the work of attendants, so as the better to admit of free passage for flood waters. In the cases of the higher streams, or parts of streams, the channels are frequently made floatable for timber and lumber passing from the forests on their head waters, also by means of dams, having permanent ways or removable weirs through or over which to float the rafts.

Navigable and Non-navigable Rivers.[1]

It is on the rivers and portions of rivers where it has become necessary to construct dams for navigation, and those, still higher, which have been dammed for purposes of floatation, that water privileges are chiefly sought after for power purposes, irrigation, municipal supply, and industrial use. Such water-courses are public property, under full control of the administration.

Non-navigable and non-raftable tributaries of navigable or raftable streams, and these streams themselves above the points where they become navigable or raftable, for the reason that it is necessary in the interest of navigation, public water supply, equity in distribution of waters to claimants below, and other reasons obvious from what has already been written, are also under the control of the administration, which is authorized to limit all diversions proportionately, or prohibit them at times, according to prefixed schedules of right, and rules and regulations framed for each case, when necessary to the public welfare.

With respect to the non-navigable arms of those streams which divide into two or more branches in their onward course, the governing rule appears to be not so well defined. When such non-navigable arm again unites with the navigable channel, it is regarded as being itself navigable, and is subjected to regulations accordingly. When such non-navigable branches do not again join the main or navigable stream below, according to some authorities, they are regarded as navigable, and the reverse is true, as stated by other writers.

Still or stagnant waters, those draining from marshes and ditches, that have free communication from navigable or raftable streams and whose waters flow the year round, or waters where ferryboats can enter at all times, and those cared for at the expense of the state, also make part of the public domain, and a right to dispose of or use them may be had only by special authorization, as in the case of navigable streams.

Forms of Organization of Irrigation Enterprise.[2]

Setting aside that very large class of cases brought up by reclamation, embankment, drainage, municipal improvement, sanitary

[1] See particularly, Dumont, § 88–91; also, Debauve, and De Passy.
[2] See, particularly, Dumont, and De Passy; also, De Buffon.

regulation, and other developments requiring the construction of works in or on the banks of water-courses, and which, equally with the class of cases herein to be considered, come under the supervision of the administration, but which are not so intimately connected with irrigation works and the use of water from streams as to justify their treatment in this report, we come now to a glance at the forms which irrigation enterprise takes, and then to the various proceedings made necessary by these varied forms of organization, to acquire the privileges desired by each.

Projects requiring special privileges to use water, or sanction of plans to erect works in water-courses, are undertaken either as private enterprises of individuals to water their own lands, to run their own mills, or for other private purposes, as coöperative enterprises of associated land-holders for the watering of *their* own lands, etc., or as speculative enterprises by individuals, associated land-holders or capitalized incorporated companies desiring to sell water to consumers. These differences of organization, together with the variation in use to which waters are put under the privileges, as already explained, make necessary different forms of application, varied formalities in the consideration of them, and distinctive forms and conditions attached to the grants which result.

Instances of individual enterprise are common on streams of all classes, but most frequent on non-navigable streams, and enterprises in which there are several copartners, rank with those individual. Associations of land-holders for irrigation usually take the form of "syndicates"—a species of organization provided for by a special law, hereafter to be spoken of (Chap. VII)—and enterprises carried on by these associations are also most common on non-navigable streams. Speculative enterprises are generally on comparatively large scales, conducted by capitalized companies, and under special grants of water privileges on the larger streams of the public domain.

In order to divide the subject well, and give a range of illustration without taking too many examples, the forms, etc., for individual enterprises, will be spoken of for both navigable and non-navigable streams, the forms for grantee companies, under the head of navigable streams, where alone they could be placed, and the forms for syndicate associations, under the head of non-navigable streams, on which they are most common.

Applications and Formalities for Water Privileges.[1]

When water privileges or permits to construct works are desired by individuals for their own private benefit, in the use of water or otherwise, on navigable or raftable streams, a formal application must be made to the prefect of the department wherein the intended work or diversion is to be made. Accompanying this application there must be a statement as to the object for which the work is intended, and the location, character, and general plan of the work itself. If the application is also for a privilege of using or diverting water, in addition to the specifications concerning the works intended or desired, there must be a statement concerning the use to which the water is to be put, the lands to be irrigated, if any, the amount desired, etc.

Under the direction of the prefect the project is reported on, preliminarily, by the mayor of each commune in which the proposed work is situated, or where its effects will be directly felt. These preliminary reports are made after due advertisement and inquiry, and the hearing of objections on the part of those who may care to oppose the measure. The sub-prefect of the arrondissement, to whom these reports are made, reviews them as he may see fit, and transmits them, with all the papers and abstracts of evidence, to the prefect. This preliminary examination is made with the view of calling out and collecting the sentiment of the people interested and as a basis for the other investigations which follow.

The results of the preliminary examination are handed by the prefect to the departmental engineer, or if there is an engineer specially in charge of the stream in question, they are handed to him, with instructions to examine and report. This engineer then holds an inquiry into the case, with the view of ascertaining the engineering bearing of the works proposed, and the manner in which other works, rights, or interests may be affected, and the public utility of the stream subserved. The engineer may take evidence of interested parties should he see fit, and must always examine the ground and locality of the proposed works. He draws a report in writing, which is transmitted, with all the papers, etc., to the chief of the engineering bureau and also to the prefect.

[1] See, particularly, De Passy, and many Decrees, etc., in the vols. of the *Annales des Ponts et Chaussées;* also, Dumont.

If it is a case in which the prefect has authority to act, he goes on with it; if not, he awaits the opinion of the engineer-in-chief. On the basis of the engineer's report the prefect instructs the sub-prefect to hold the final inquiry, notices of which are duly published. All of the papers are opened to inspection, and the plans to criticism, at the mayoralty house of the local commune. The engineer may be called upon to revise the plans or to modify the project to suit the case or do away with objections.

Finally, the sub-prefect reports the results to the prefect, and, if it is a case in which his authority is competent, he issues or denies the desired permit or privilege; or if his authority does not meet the case, he refers it to the central administration, which in due time acts by decree of the council of state.

Water Privilege Grants—Examination of Projects.[1]

Where water privileges on streams navigable and of the public domain are desired by individuals, companies, or societies, for speculative purposes, all permits and concessions have to be acquired by decree deliberated upon in the council of state. In this class of cases a still more formal line of proceedings has to be followed out than those already described for individuals obtaining permits to water their own lands, or for other purposes of private use.

The application for the grant of privileges, etc., is made to the prefect of the province. It must be accompanied by:

(1) An outline map of the proposed district to be irrigated, showing property divisions and other features, and indicating by special tinting the irrigable lands under the project.

(2) A statement in detail of the extent of each district, with the names and residences of all land proprietors therein.

(3) A statement of the conditions proposed to be attached to the contract of the grant and accepted by the petitioner.

(4) Preliminary plans, specifications, and estimates of the works, drawn out in considerable detail.

The project is submitted by the prefect to the proper engineer, who gives an opinion as to the public utility of and necessity for the works. The prefect then indorses his own views in this re-

[1] Same authorities as for preceding subdivision.

gard upon the report and forwards it to the minister of public works. Following this and on instructions from the minister, the proceedings heretofore described, in which all interested parties have their hearing, are had under the supervision and conduct of the departmental administrative officers and engineers.

Upon the results of these inquiries being returned to the minister, together with the reports of the engineers, he brings the whole subject before the council of state, with his opinion and recommendation. Should the petition be acted upon favorably, the minister of public works enters into a contract with the grantee, in such way as to guard the interest of the public and of the land-holders in the district, and a decree is issued granting the privileges desired and stipulating the conditions attached. Large works of this kind are considered of such great public value in France, and local financial conditions are so much against their undertaking, that the government, as elsewhere explained, on proper showings being made, engages to pay a subsidy to the grantee company, or individual, as the works are carried out and completed.

The Case of the Bourne Canal.[1]

I take, as an instance of such a work and grant, the case of the canal of the Bourne River, in the department of the Drôme, which was authorized in February, 1874. Application was made by three individuals, on behalf of a society organized in the region of the proposed irrigation; not as a syndicate of land-holders to irrigate their own lands, but a company to carry out a project as a business proposition, and to deal with several syndicates of land-holders desiring irrigation for their lands. The formalities being gone through with, the minister of public works entered into a preliminary convention or agreement with the society, in which terms of the concession were drawn out in detail.

There being some doubt as to the proper proceedings, and a large subsidy being asked, the matter was brought before the national assembly for confirmation by a special law. This was passed in May, 1874, declaring the public utility of the work, sanctioning the terms of the preliminary agreement made between the minister and the grantees, ratifying the engagement to pay the subsidy, and prescribing a form for the final contract, covering the prin-

[1] See, the *Annales des Ponts et Chaussées*, Laws and Decrees, Vol. CXXVI, p. 451, *et seq.;* also, De Passy, p. 363, *et seq.*

cipal points of the preliminary agreement. I have made an analysis of these documents, grouping their important points under suitable headings, and here present the results, as follows:

Obligations of the Grantees.

The company is obliged:

1. To build at its expense, risk, and peril, the principal canal, the two additional diversion canals, the secondary canals, and the tertiary canals and ditches intended to lead water to each irrigation proprietor's distributing gate.

2. To maintain the principal and the two diversion canals at its own expense and under its own immediate care, and to maintain the secondary and tertiary canals and ditches, etc., at its own expense and under its own care, or, by an arrangement for the purpose, under the care of the irrigators.

3. To construct at its expense, delivery and distribution works, for water for domestic purposes, for each commune, with branch pipes and faucets to each house entrance for each subscriber.

4. To maintain these works and all parts of them, down to pipes which carry two decilitres (c. ft., 0.007) of water per second.

5. To submit for the approval of the minister of public works, within the year following the giving of the concession, a detailed plan of the dam and the headworks to be constructed for the principal canal and the two subsidiary canals of diversion.

6. To completely finish the principal canal from the Bourne River, in working order, within five years from the date of approval of the concession.

7. To construct the secondary and tertiary canals and ditches for distribution, in each instance, as soon as the subscriptions for water to be delivered by the particular work are sufficient to assure a revenue of six per cent on the cost of the work, according to estimates to be approved by government engineers.

8. To complete each distributing system, when once commenced, within two years.

9. To commence the subsidiary diversion canals—from the Lyonne and Cholet rivers—so soon as water is subscribed for to the extent of five thousand litres (176 cubic feet) per second, and after the commencement of the main canal, and to finish them within two years after commencement.

10. To reëstablish and maintain at its own expense the free flow

of all drainage waters, whose course may be intersected by the works.

11. To do all possible at all times according to the rules laid down by the administration to stop seepage waters from the canals and other works built by the company, and stop all undesired wetting of lands and property.

12. To construct, at its own expense, permanent bridges for crossings of all existing ways of communication, encountered by the canal, according to approved plans, and of dimensions specified in the official agreements for roads, etc., of different classes and kinds.

13. To construct for use, pending the completion of these permanent crossings and the canal, adequate and safe temporary crossings and side roads for the traffic, according to approved plans.

14. To manage its work according to approved plans so as never to interrupt traffic on any railroad or other principal line of travel.

15. To conform to all rules hereafter made by the administration relative to the preservation of safety of travel.

16. To use materials for the several distinctive parts of the various classes of structures to be built, of the kind and quality preliminarily specified.

17. To buy and pay for all lands to be occupied by the main, secondary, and tertiary canals, and other works forming a part of the system.

18. To pay for, as a servitude, the right of way for smaller ditches of distribution.

19. To pay all indemnities for temporary occupation or deterioration in value of lands, or for the stopping of manufactories pending construction of any work, and all damages whatsoever which should occur in consequence of such cessation, or the execution of works.

20. To maintain, at all times, the principal canal, with its diversions and dependencies, in a good and efficient state of repair and order.

21. To do all that can be done to assure, during the irrigating periods, the full supply of water contracted to be delivered periodically to the irrigators.

22. To do all that can be done to regularly deliver at all times the quantity of water engaged for public or private use, for power, machinery, and industrial purposes.

23. To mark out the boundary of the districts and sub-districts of irrigation, and make complete maps of the same.

24. To survey, stake out, and prepare complete plans of all canals and ditches.

25. To plan, describe, and specify in detail all works entering into the system, before they are undertaken.

26. To pay taxes on lands occupied by all its canals, structures, and other works.

27. To pay taxes on buildings, sheds, and storehouses.

28. To pay taxes on its canals and ditches.

29. To guarantee to deliver, on demand, at times of lowest supply, the full amount of water subscribed for by a certain number of subscribers who subscribe first.

30. To suffer a deduction of rents in case of non-delivery of waters, except as per condition No. 24, following.

31. To suffer roads, railroads, etc., approved by the administration, in future, to be built across its works.

32. To employ such agents and guards for the police of the canal, for the supervision of its working, as can be sworn as rural police officers.

33. To bear all expenses of preliminary examinations, surveys, plans, etc., all expenses of construction, etc., superintendence, government examination and engineering, supervision, and examinations for acceptance on completion.

34. To have the headquarters at Valence, there to have a resident agent authorized to receive all government communications and generally transact the business of the company.

35. To deposit within eight days after final organization of the company, in the consignment fund of the treasury of state, under the title of a bond, the sum of 75,000 francs ($15,000), to be held until the works have progressed to the expenditure of 300,000 francs ($60,000), as reported by the government engineers, etc.

Conditions of the Concession.

The grantee has certain privileges, under conditions as follows:

1. That it (the company) always leaves in the water-courses whence it derives its supply, at lowest stage, a flow below its dams of at least half a cubic metre (17.5 cubic feet) per second.

2. That the individual distributing headgates, drainage ditches,

and other such works, shall belong to the irrigator in each case, and be built by him or at his expense.

3. That the consumers can compel the company to construct any certain distributing system when they have subscribed for enough water to be delivered by it to guarantee six per cent interest on its estimated cost.

4. That all plans for the main works be approved by the central administration before construction.

5. That all plans for distribution works be approved by the prefect of the department before construction.

6. That plans for all works shall first be approved by the chief of the government civil engineering bureau.

7. That all changes of plans shall be approved by competent authority before the work is executed.

8. That the society shall execute the works under the superintendence of its own agents, but under the supervision and inspection of those of the government.

9. That all works, during the term of the concession, be subject to inspection annually, and oftener if deemed necessary in cases of accident or complaint, by the government engineers.

10. That in all that concerns supply, maintenance and repairs, either ordinary or extraordinary, upon the failure of the company promptly to act, the administration, through the engineers, may carry out the necessary measures or works at the expense of the company.

11. That the main works will be provisionally received, upon the favorable report of a commission of inspection appointed by the administration, each as completed.

12. That the final reception by the central administration will not take place until one year thereafter.

13. That the report of the commission of inspection be in each case accompanied by full and final plans and reports of the work done, prepared at the company's expense.

14. That two copies in full of these plans, reports, etc., be furnished, one for the department offices, and one for the central administrative offices, at the company's expense.

15. That the same operation shall be gone through with after completion of the secondary systems of works, but that in these cases the reception be made by the controlling engineers and approved by the prefect of the department.

16. That if within two years after the date of the concession the company has not commenced the main works, it forfeit all rights under the agreement.

17. That if within the term of five years the company has not completed the main works and fulfilled other requirements specified, it forfeit all rights and properties, which are to be disposed of as the government may direct.

18. That, in the event of forfeiture, the company is to receive from the party into whose hands the property goes, a sum to be adjudicated by referees.

19. That, if after two trials at settlement, as to amounts to be paid, there be no agreed result, the company forfeits all, summarily.

20. That forfeiture cannot be enforced if great unforeseen circumstances intervene to prevent the completion of the obligations.

21. That the administration shall determine the duration and time of the irrigation period each year.

22. That irrigation necessities are to be preferred to those of manufacturing.

23. That subscribers may, by payment of a sum to the society, which, at six per cent, will represent the capitalized value of their water rents, thereafter be freed from payment of such rents.

24. That no reduction can be demanded on water rents should a scarcity of supply result from accidents not to be guarded against by the company.

25. That subscribers are bound to irrigate land at the rate of one hectare (2.47 acres), or less, to the litre (0.03 cubic foot) per second[1] of water subscribed for, and not to divert the water for any other purpose than as agreed upon by the subscription. Nor can any subscription be for a less amount, for irrigation, than one litre per second.

26. That the consumers of the water in the sub-district supplied by each secondary canal may form a syndicate association, under the terms of the law for such organizations, and take out of the hands of the company the works of that sub-district, by paying annually, in bulk, to the company, a sum equal to six per cent on the cost of the works, or a sum equal to the water rents subscribed in the district, according to the water demanded.

27. That the company may transfer the works in any sub-dis-

[1] At least 82.3 acres per cubic foot per second.

trict to a syndicate of the consumers for any agreed upon amount; but must thereafter deliver all water subscribed for in the subdistrict.

28. That the grant or concession to the company be for a period of ninety-nine years, commencing from the date of the provisional acceptance of the main works.

29. That at the expiration of the time of concession, the company have no more right to the works, but the whole property be turned over to the state in good condition.

30. That, to insure this last condition, the works are to be inspected and put in proper condition, under the direction of government engineers and at the expense of the company, within the two years preceding the expiration of the term of concession.

Privileges Granted to the Company.

On the foregoing conditions the company has the privilege:

1. Of taking seven cubic metres (245 cubic feet) of water per second from the Bourne River.

2. Of making up this volume at low stages, by taking two cubic metres (70 cubic feet) from the rivers Lyonne and Cholet. (See condition No. 1.)

3. Of supplying a certain district of 22,000 hectares (54,340 acres) in area, of which 10,500 hectares (25,935 acres) are irrigable, with water for all purposes—irrigation, manufacturing, industrial use, domestic, and municipal purposes.

4. Of doing work and using material of a better class than preliminarily specified, according to the judgment of the government engineer.

5. Of showing the administration at any time why plans of construction should be changed, and asking for changes.

6. Of representing to the administration at any time, conditions or facts which has rendered it impossible to fulfill its engagements.

7. Of shutting the water off from the canals, for purposes of repairs and clearances, for one month each year, at a time to be fixed by the prefect of the department, and not in the irrigating season.

Benefits to the Grantee Company.

And the company is the recipient of benefits as follows:

1. The authority to collect water rents, for the term of ninety-nine years, as follows:

For irrigation—From all who subscribe before the water is put in the main canal, for a fixed amount of water annually, at the rate of 50 francs per litre ($269 per cubic foot[1]) of discharge per second during irrigation.

From all those who subscribe after the water is put in the main canal, at the rate of 60 francs per litre ($323 per cubic foot[2]) of flow, etc.

From the first subscribers above named, for an additional amount, engaged after the water is put in the main canal, equal to that at first subscribed for, at the same rate of 50 francs per litre ($269 per cubic foot) of flow, etc.

For all subscribed for by them over this double of the first subscription, at the rate of 60 francs ($12), etc.

For domestic, municipal, garden watering, ornamental, and other similar purposes—For a continual supply, at rates stipulated, etc.

2. The authority to sell motive power, during the term of the concession, to individuals who want to utilize it for factories, at an annual rental of 200 francs ($40), per one horse-power; a single horse-power being represented by a volume of 100 litres (3.5 cubic feet) of water per second, having one metre (3.28 feet) fall.

3. The authority to collect, under the executive power of the prefect of the department, and in the same manner taxes are collected, all rents for irrigation waters subscribed for, during the last three months of the year, in advance.

4. The authority to collect, in the manner spoken of above, all rents for water for domestic, municipal, and other similar purposes, and for motive power, at the commencement of the year, in advance.

5. And finally, the government, through the minister of public works, after the company has shown a subscription for water to the amount of 3,000 litres (106 cubic feet) per second, or more, engages to pay the company a subsidy of 2,900,000 francs ($580,000), as follows:

Ten per cent on final completion of all works. Two thirds of balance on works done or expenses incurred on main canals and works, in installments amounting to one third of actual costs, as reported by the government engineers. The other third, in the same way, on works of the secondary and distributing systems, etc.

[1] At most $3 27 per acre per season.
[2] At most $3 92 per acre per season.

SECTION II.

Regulation of Works.

Government Improvement of Navigable Rivers.[1]

The rivers of France generally have high rates of slope and rapid currents, where works of irrigation and water power are constructed. The channels are through heavy formations, as compared to the alluvions of Californian valleys, and the beds are almost always gravelly, and not infrequently rocky. Such streams may in their upper courses pass through alluvial irrigable valleys, and then again meander through ravines and rolling lands. It is due to these characteristics of the hydrographical system that water power early came into very extended use in France, and, following the development of trade thus caused, that the demand arose for making the streams themselves navigable.

Thus, the system of canalizing rivers by means of dams, in series, at intervals along their course, making nearly slack water navigation between each two, naturally came into being, and has resulted in a high degree of skill and perfection of practice in the general disposition of such works and arrangement and construction of their parts. The French masonry and iron frame movable dams of several distinct types and patterns, are models of construction in this line for engineers of other countries, where similar conditions obtain and like purposes are to be subserved. The government civil engineers have charge of such rivers throughout their valley course, and it is the endeavor to bring all works into harmony with a system best calculated for the public utility of the streams and the safety and well-being of the interests along their banks.

Extent and Field of the Hydraulic Service.[2]

The hydraulic service of the public works bureau comprehends the supervision of river bank and channel works relating to the creation of power for manufactures, diversion of water for indus-

[1] See, Debauve, and articles referred to by him in "*Les Annales des Ponts et Chaussées;*" also, Malapert.

[2] See, De Passy, Malapert, p. 417, and elsewhere.

trial uses, for irrigation and *colmatage*,[1] the cleansing or dredging and improvement of channels, construction of embankments and other defenses against floods, draining of marshes, sanitary improvement of moist lands, and agricultural drainage. By the very nature of the objects contemplated, the service is divided into two sections—one dealing with those cases where the water is an auxiliary in the accomplishment of the purpose held in view, the other with those cases where it is an enemy to be encountered in effecting the desired end. Works connected with manufacturing, industrial, and other uses, irrigation, and colmatage, fall in the first section, while all others mentioned above naturally rank in the second.

The Principles of Coöperation and Compulsion.[2]

When the water is an auxiliary, enterprises are frequently carried out by individuals, as in manufactories, etc., and always by voluntary action. While in irrigation and colmatage enterprise, the initial movements are frequently on the part of collective interests, but always voluntary, so far as each individual at interest is concerned.

When, on the contrary, the water is an enemy, as in the improvement of channels, sanitary drainage, works of defense against floods, there is always an indissoluble common interest at stake, so that the movement must benefit all land within some certain district, primarily, and the public generally as well, or else fail to benefit any. In these cases the enterprise must *necessarily* be on the part of the collective interest of all concerned, and the law submits the minority to the will of the majority of interested landholders in the district. "It cannot be allowed," says De Passy, "that enterprises so essential to agricultural development be defeated by the resistance or indifference of an ignorant and capricious minority."

Moreover, if it is recognized that the enemy to be fought inflicts injury on the public interests, the administration has the right to interfere and render obligatory the common action of all interested parties in the district, in spite of the opposition even of a majority.

[1] *Colmatage* is the French word for warping, silting-up, or enrichment of lands, by leading muddy waters upon and causing the silt to be deposited on them. It is extensively practiced in many quarters of France, Switzerland, and Italy.

[2] See, De Passy, pp. 7–11.

Regulation of the Construction of Dams.[1]

Whenever possible, the holding up or diversion of water for a manufactory, an irrigation canal, an industrial establishment, or other use requiring the construction of a dam in the river and acquirement of elevation in the water plane to give a head for power or for flow out from the channel, is effected by a work which serves at the same time to hold back water for the promotion of navigation. The height of such a dam is limited by the elevation of the plane of safety to the lands which might be flooded by back-water were it carried too high, and, at the same time, it is governed by the requirements of navigation for a certain depth of water in the reach above.

The cost of such works, in so far as they relate exclusively to navigation, is borne by the state; the grantee of the water privilege, for whatever purpose the use may be, exclusively bearing the cost of his sluices and gates. When, however, dams are designed and constructed for the common benefit of navigation and some water privilege establishment, they are paid for and maintained at the joint expense of the state and the water grantee, in proportion to their respective interests, unless special agreements of long standing determine the distribution.

The distribution of expenses for construction, as well as for maintenance of works built conjointly by the state for navigation and water grantees for their purposes, is made before the works are executed, in every case by the central general administrative authority—the whole council of state in general assembly—and is promulgated in an administrative decree. The grantee's part of the cost is fixed at a sum to be paid annually, and not in a sum paid at once. Thus the coöperation of the grantee with the government results in his paying an annuity for his benefits from the construction, and not in his paying at once, in part for the work itself, and thus acquiring a right of property in it; for works of this character, forming essential parts of the system for navigation, must remain always public property.

The determinations of the council of state in these matters are based on the reports and estimates of the government civil engineers, and are also shaped in accordance with equities arising from the peculiar circumstances of each case, taking for com-

[1] See, De Passy, pp. 299–324.

parison, if need be, the results of other similar works carried out under parallel circumstances. Whatever is paid by the water-privilege grantee, goes into the coöperation fund for public works, under the control of the minister of public works.

Such works are built and repaired and wholly cared for by the administration, and, as far as necessary, under the advice or direction of the government civil engineers. In cases where a new dam, not necessary for navigation, is to be established for the benefit of a water-privilege grantee, he is obliged to provide in his plans and construct at his expense, a proper lock for the passage of boats. Should the administration recognize in the work a benefit to the river navigation, the government may contribute to the cost of the lock. Plans for works constructed by grantees alone, are always subject to revision by the government civil engineers, and the carrying out of such works is subject to their inspection and approval or condemnation.

Regulation of the Construction of Headworks.[1]

Headworks designed for taking water for any purpose of a holder of a water privilege are always constructed and maintained at his expense, and when in close connection with a dam for navigation purposes, are carried out by the administration, or under the immediate supervision and superintendence of the government civil engineers, or, if not connected with a navigation dam, they are subject to supervision only, the plans having been approved. As waters for manufacturing, irrigation, and other grantee purposes (except in the case of supply to municipalities for domestic purposes), can only be drawn from the excess of supply over demand for navigation purposes, the determining and gauging of the quantity allowed, so that at times of scarcity equity may be observed in apportioning the available surplus, becomes a matter of extreme importance.

The forms and dimensions of the sluiceways, or gate openings, the elevations of the sills, with respect to that of the dam's crest and the legal low water plane of the river, always form the subject of a special clause in the decree authorizing the establishment of the works, and hence any modification in the plan of a dam or headwork intended to divert water, cannot be made until duly authorized by government. If the quantity of water to be taken

[1] See, De Passy, pp. 306-316; also, Dumont.

in any instance amounts to a considerable volume per second, as is commonly the case in works intended for irrigation, it becomes necessary, in providing for the regulation of the discharge, not only to determine and fix the size and form of the headgates, but also the form of section and gradient of the canal or other waterway leading therefrom, for a certain distance varying with its size. "For, in all cases, it is to be remembered that the sluice for taking water is the sluice for guarding it."—[De Passy.

If the quantity to be taken is small, in the case of irrigation, it is deemed sufficient to provide for taking it through a culvert or pipe of determined area and under a fixed head. In cases where water is delivered in rather small quantities for distribution by sale, it is parted out into a "sump," and then more accurately measured over a gauged weir, of which the crest is arranged so as to preserve a fixed head of water, producing the requisite discharge.

SECTION III.

Operation and Maintenance.

General Maintenance of Works.

Concerning the subjects of this heading, very much has necessarily been said under those which precede, nevertheless, it will be well to call attention to some leading points already mentioned, in connection with matters not yet spoken of.

The care of all navigable streams in France is committed to the administration; all public works pertaining to the stream as a navigable channel, or as a drainage way of the country, are in care of the officers of the hydraulic service, and their assistants and subalterns. These officers are, as a general thing, civil engineers, holding commissions as such, and are under the government public works bureau.

The maintenance of all private works bordering upon, or in such streams, and calculated to affect them as navigable channels, or as natural drainage ways, is subject to conditions imposed in terms of the grants of privilege, and subject to the general and particular regulations of the administration, as executed by the officers of the hydraulic service.

Works of navigation, are, of course, maintained and operated solely by the government, the tolls on navigation, which are very low indeed, defraying these expenses.

Works built on joint account of state and private enterprise, are maintained and operated under government direction, at joint cost according to prefixed agreements, or as may be equitable under the circumstances, or, again, as may be customary from ancient times.

Works solely for the benefit of private interests are maintained under administrative supervision, at the expense of the owners, and if the work of maintenance is not properly and promptly done, the administration, if public or communal interests are threatened from negligence or faulty construction, may carry it out at the expense of the owner or responsible party.

Cleansing or Dredging of Channels.[1]

Besides the special and local operations of maintenance applicable to works on the streams, there is the care of and cleansing or dredging of the channels themselves, and the police of their banks. The necessity for cleansing the channels of water-courses in France arises largely from natural causes, such as abrasion of stream banks and denudation of lands; but artificial causes, such as deposits from boats, and from the shores by the inhabitants, by towns, and industrial establishments of all kinds, contribute largely to the results. The dams built in the channels for the promotion of slack water navigation, or for the creation of power heads for manufactories, or for whatever purpose, prevent the scouring of the beds, and serve to cause deposits of sediment and filth that otherwise would be carried away by the currents.

Upon navigable and raftable channels, of which the beds and banks are public property, the clearances are made chiefly at the expense of the state. When the dams on such streams are used to create water-heads for power purposes, as well as for navigation, the holders of the water rights are called upon to pay part of the expense. When the administration believes that the cleaning work is necessary only in the interest of navigation or raftage, its cost is borne solely by the government. When the clearings are necessary solely in the interest of public health, and are made necessary by the deposit of filth in the channel, from towns, resi-

[1] See, De Passy, pp. 323-328; also, Dumont.

dences, and establishments on the banks, the expenses are charged for the most part to the riparian owners and the towns, and in a small degree to the state and the manufacturers whose dams increase or favor the deposits. Such cleansings are ordered by the superior administration, which determines the basis of the work and the distribution of expenses, on the reports of the engineers and local administrative officers.

Upon non-navigable and non-floatable water-courses which have not been declared to be dependencies on the public domain under article 538, civil code, and which have not been improved in the interest of navigation, the expense of cleaning and caring for the channels is borne principally by the riparian land owners, as will be seen in the next chapter.

Police of Streams.[1]

Works erected and acts committed in the channels or on the banks of non-navigable or non-raftable water-courses, when they present no obstruction to free flood-flow, as they only give rise to questions between private interests or individuals, are subject only to regulation by the law as administered by the courts. In these cases it is necessary only for the administration to examine the project with the view to determining whether or not the stream channel or the public interests are likely to suffer, or the flood plane likely to be affected by its results. Works located upon navigable or raftable streams when not duly authorized by the administration, constitute infringements of the laws of the commission of public ways, and are subject to repression by the council of prefecture.

The legislation in the matter of police of public water-courses and canals is found in the judgment of the council of state of the king, dated twenty-fourth June, 1777, confirming and completing former rules, notably those of forests and waters, dated August, 1669. The various articles of the judgment of 1777, specify the penalty attached to each kind of offense enumerated.

Besides this old general law, there still exist in force a number of ancient special enactments applicable to the principal rivers and to certain navigation canals, emanating from the king in council of state, from the governors of provinces, and from other author-

[1] See, De Passy, pp. 325–334, and elsewhere; also, Dumont, De Buffon, and Malapert.

ities who under the ancient régime exercised the ruling power. Other ruling enactments on this subject bear dates subsequent to the revolution, but none of them are of recent origin except that of twenty-third March, 1842, although there are many decisions under these laws that interpret and modify their application.

The penalties fixed in the old laws were very severe in proportion to the offenses to which they were attached, and the councils of prefecture, in the administration of the laws, had no alternative but to apply them in full vigor, for the mitigation or repression of such penalties could only be authorized in each particular case on an appeal to the chief executive power of the council of state. The law of 1842 gave to the councils of prefecture the authority to gauge the penalties to the offense in each case according to circumstances, between 16 francs ($3 20) as a minimum and 300 francs ($60) as a maximum for ordinary offenses.

Works having a direct effect to the detriment of public interests may be summarily removed on the order of the prefect, and formerly unauthorized works on public water-courses, whether injurious or not, could be similarly disposed of without delay. But now in cases where no injury is done or immediately threatened, a delay for a reasonable time is granted to give the owner of the works time to appeal to the superior administration for a proper authorization for his enterprise. The execution of all laws governing the police care of public streams in the interest of the public, whether protecting navigation or other particular interest, is left to the prefects of departments. But a large class of cases, where the laws have to be interpreted, and where private interests are affected, find jurisdiction before the courts.

Water Privilege Rents.[1]

Every concession of a water privilege on streams of the public domain is subject to the charge of an annual rental which goes into the general treasury of the state for the benefit of the public works.[2]

In the case of water-heads for manufactories, the rent is based upon the purchasable value of the gross power conceded, independent of any special advantage which the grantee may get from it, and of the kind of employment to which it may be de-

[1] See, De Passy, pp. 306–307, 314–316, and elsewhere; also, De Buffon.
[2] Financial Laws, June 16, 1840; July 14, 1856.

voted. The rate of rent for a manufactory water-power head is a sum per annum equivalent to one two-hundredth of the purchasable value of the motive power measured in horse-power. The purchasable value of the horse-power is determined by precedents on the stream in question, and on other similar streams where water is used for like purposes.

Water privilege rents for irrigation works are rated upon the basis of the increase in yield due to irrigation, and are fixed at a sum annually paid, equivalent to one tenth of the increase in value of produce on the irrigated land, over its produce before irrigation.

Industrial purposes include all the purposes of manufacturing, except that of creating motive power by means of water-wheels; thus water for making steam, for condensing steam, for the use of paper mills, sugar refineries, tanneries, bleaching works, cloth printing works, etc., is ranked as used for industrial purposes. Whether taken by means of pumping machinery or not, if the volume of water in any instance drawn directly from a public stream for an industrial use is sufficiently large, in proportion to the supply at any season, to sensibly affect, or, in the opinion of the engineers of the administration, injure the normal régime of the stream, the water privilege is ranked with those for water-power purposes. For all concessions of water for industrial purposes, the basis of annual rental is a fixed sum which is adjudged for each particular case, the minimum being one franc and an additional ten centimes per cubic metre or fraction thereof of water taken per day.

Water-heads for municipal domestic purposes are governed by the same rules as those for industrial purposes.[1] When the object of the works is simply the supply of domestic requirements, without revenue being derived by the sale of the water to consumers, the rent is fixed at the nominal sum of one franc (20 cents) per year; the object being merely to assert and maintain the right of the state to regulate and control such matters. When the intent of the grantee, whether a town or a company, is to sell the water to consumers and derive a revenue from it, the case is ranked as an industrial use, and in addition to the fixed amount of one franc, a charge of ten centimes per cubic metre (35 cubic feet) of water drawn daily, is imposed.

[1] Decrees March 25, 1872; April 13, 1861.

The amounts of all annual rentals are based on the reports of the government engineers as to volumes diverted and according to gaugings and records, and when a gauging is made and a record is kept, the grantee is obliged to assent to its correctness, or at the time show it to be erroneous.[1] Back rents for water can be collected for five years, but recovery for a longer period of time is debarred by a statute of limitations. All questions as to rates for rents are considered by the ministers of public works and of finance, conjointly.

Without meaning in any way to limit the duration of water concessions, the rents are revised every thirty years, for, although revokable at any time, water-right concessions on public streams are given for an indefinite time, and in most cases practically for ever. Any other system would be opposed to the development of industrial prosperity. Water privilege heads held in private control previous to the edict of 1566 declaring the inalienability of the public domain, are free from the charge of rents, as are also those whose holders have titles derived by purchase from the government.

AUTHORITIES FOR CHAPTER III.

Dumont.—[Work cited as an authority for Chapter II.] See Book II, Chapters I, II, and III.

De Passy.—[Work cited as an authority for Chapter II.] See pp. 7–11; supplement, pp. 297–334.

Malapert.—[Work cited as an authority for Chapter II.] See the headings, "The Actual Republic," and "Engineers."

De Buffon.—[Work cited as an authority for Chapter II.] See, generally, Vol. II, Part II.

Reclus.—[Work cited as an authority for Chapter II.] See, generally, descriptions of France.

Debauve.—Vol. XIX. [Work cited as an authority for Chapter II.] See, generally, description of river works and systems.

Les Annales des Ponts et Chaussées.—A semi-official publication of the French Government Corps of Civil Engineers; comprising volumes of Technical or Engineering matter, and others of Laws and Decrees relating to Public Works and the Engineering Service, generally (French). See late volumes, and, particularly, Vol. CXXVI, pp. 451, *et seq.*

[1] Decree of the Minister of Finance, May 15, 1863.

CHAPTER IV.—FRANCE[3];

WATER-RIGHTS ON, AND THE ADMINISTRATION OF NON-NAVIGABLE STREAMS.

SECTION I.—*Rights to the Use of Water.*
Water-rights previous to the time of the Code Napoleon.
Riparian Water-Rights under the Code.
Nature of the Riparian right, and tendency of interpretations.
The right of Irrigation—absorption of water, etc.

SECTION II.—*Supervision of Construction of Works.*
Decentralization of the Administration.
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SECTION III.—*Regulation and Operation—Works and Waters.*
Necessity for Regulations and Administration.
Administrative Authority to make Regulations.
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SECTION I.

RIGHTS TO THE USE OF WATER.

Water-Rights Previous to the Time of the Code Napoleon.[1]

As we have seen, streams not navigable nor floatable—those upon which tolls could not be collected for navigation or rafting facilities, or heavy rents derived from ferrying franchises—having been claimed and controlled, together with all other water-courses, by the feudal counts during the early centuries of modern ages,

[1] See, particularly, Dalloz, Vol. XIX, pp. 312-319, and Dumont; also, De Passy, and Malapert.

were also included in the property-right claim of the kings, and originally contended for by them against the counts; but in the course of time the struggle was made only for the control of the larger water-courses, from which revenues could be derived, and those of the smaller class were left to the owners of the lands adjoining them. Matters appear to have rested in this way for a long time; the exclusive right to water, for milling and irrigating purposes, from streams too small to be regarded by the kings as of public importance, according to the standard of the times, being accorded to the owners of the bank-lands, apparently upon the ground that they owned the beds and waters as well as the banks.

In later years, when it was found necessary in the public interest, and to rid the courts of a vast volume of litigation, for the government to supervise the placing and maintenance of structures in such channels and the diversion of their waters, it appears to have become recognized that the waters were in reality a common property, and that the bank proprietors had only a right to use them and not a right of ownership in them. Still there was the open question, to whom were the waters a common property: the riparian proprietors claimed to be the owners in common of the waters of each stream, and submitted to the control of the streams by the government only as it was based upon the general police authority of the nation; while the government asserted its right to control, not only because of its general police powers, but because of the fact that the waters were really the common property of the whole people and not of the riparian proprietors alone, and that public interests were to be promoted as well as other private interests guarded by it, and that, hence, its mission was one to promote public utility as well as to repress or prevent abuse of private privileges, by the protection of other privileges.

Conflicting Interests on the Streams.

The continued and growing abuse of the riparian water-right privilege brought about an increased necessity for upholding this latter view, so that from having been a governmental administrative measure it became a popular sentiment, and owners of lands not riparian to the streams asserted a right to waters for their irrigations, on the ground that such waters were a common property of all the people; and claimed that the riparian owner's

privilege of using them was not an exclusive privilege, but that upon a grant or permit from government, any land owner could divert them for use on his lands. In this view of the case by far the greater number of land proprietors were interested, so that the governmental policy of control was strongly upheld.

But now, manufacturing interests, which were widespread and becoming powerful, took alarm. The owners of the hundreds of mills and manufactories depending on water supply for power and other purposes, scattered along the streams all over France, and holding rights, many of them dating back in the times of the counts, and all valuing the riparian right as a protection to their water supply, were arrayed against the advancing theory—of the waters belonging to all the people and due to all for use. The government from time to time brought to face the question in deciding points at issue, continued to uphold the theory of the waters of these small streams being a common property of all the people, and framed its own measures accordingly, but no step was taken to accord land owners other than riparian proprietors any right to use them.

Riparian Water-Rights under the Code.[1]

The case appears to have stood in this way when the Code Napoleon was promulgated in 1804. This code contained provisions (articles 713, 714) which in course of time were recognized as placing the ownership of the waters of the smaller class of streams in the nation, but, at the same time, declaring the use of things of this class to be common to all. Left with this provision only, the waters of these streams would have been thrown open to use by all the people; "the laws of police regulating the manner of enjoying them," as the code said. But article 644, under the head of servitudes, seemed to place a special servitude (right to use) on these waters for the benefit of riparian estates. It reads as follows:

"He whose property borders on a running water, other than that which is declared a dependency on the public domain by article 538, under the title 'Of the Distinction of Property,' may employ it in its passage for the watering of his property."

"He whose property is intersected by such water is at liberty to make use of it within the space through which it runs, but on

[1] See, particularly, Dumont, pp. 171-208, and De Passy; also, Dalloz, Vol. XIX, pp. 379-390.

condition of restoring it at the boundaries of his field to its ordinary course."

The provisions of this code have given rise to many questions, or rather to the old questions in new forms, accompanied by an infinite number and variety of side issues. The old question as to whether or not the riparian water-right privilege was an *exclusive* right, was still left open and with additional complications. The government had its hands strengthened in its policy of control and regulation, and the fundamental principle contended for by the owners of lands not riparian to the streams, as well as by the government, was recognized.

But riparian proprietors claiming and being, in some cases and under some circumstances, allowed ownership of the beds of the streams, still claimed ownership of the waters by virtue of article 552, which reads: "Property in the soil imports property above and beneath." And a stand was thus made by riparian interests, on the point that as the waters of the streams rested on their lands, they belonged to them, and, hence articles 713 and 714, about "things which belong to no one," had no application to them. Article 645 provided expressly for the settling of disputes which should arise under the preceding article, at least, in the following language:

"If a dispute arise between proprietors to whom such waters may be useful, the courts, in pronouncing their judgment, must reconcile the interest of agriculture with the respect due to property; and in all cases, particular and local regulations on the course and use of waters must be observed."

Under this article all questions as to rights to use waters from non-navigable and non-raftable streams have been carried before the courts, and these have not directly recognized the claims of the back land owners, thus leaving the riparian proprietors in possession of the field. Appeals have been then taken to the central administrative authority to exercise its power in behalf of the land interest which had always in the past sustained its acts and theory of public ownership and government control of the waters. But the administration has consistently replied to these appeals that, under article 645, it had no jurisdiction in this class of cases; that the courts were the only resort of those claiming water in this class of streams, in which to make good a claim.

The Riparian Water-Right and the Right of Way.[1]

Another point which for a long time was in favor of the riparian proprietors, was the fact that there existed no law under which a back land owner could get the right to conduct water over the property of those between him and the stream, even though he had the right to it, and no law under which he could get the right to abut a dam against banks belonging to others, even if he could get the right of way by amicable purchase, and the water also; and, furthermore, the administration could not grant such privileges.

Companies or syndicates contemplating extended irrigation enterprises were granted water privileges and the right to construct works by decrees of the central administration, and their works being declared of public utility, they were authorized to condemn by process of law the right of way for their main canal. But no single land owner, and no enterprise not declared to be of public importance, could get right of way, except by private negotiation.

In 1845 a law was passed giving any land owner the power to secure as a servitude, over lands not his own, the right of way to conduct waters to which he had a right of use. This was ostensibly in the interest of riparian proprietors who had to take water out of the streams above their own lands to get it high enough to conduct on to them. But it was also a step in the direction of the theory of the back land owners.

In 1847 a law was passed giving the owner of one bank a right to abut his dam against the bank owned by his opposite neighbor, under certain regulations and administrative sanction, etc. This also was a step towards breaking down the exclusiveness of the riparian right to the stream. Until within the past few years a riparian proprietor, upon the basis of his claim of ownership of the banks and bed of a stream, so far controlled the channel, as against other private individuals themselves also riparian proprietors, as to deny the right to construct a dam below in such manner as to back the water up into the channel opposite his land, even though there was no apparent material injury to him caused thereby.

But now the court of cassation, at the head of the judiciary of the country, and the council of state, at the head of the advisory department of the executive branch of government, have each

[1] See, particularly, Dumont, pp. 225–256, 259, 280; De Passy, Dalloz.

decided that "the fall or slope of a channel is not the property of the land proprietors, and that it enters into the class of things which by the terms of article 714, Code Napoleon, do not belong to anybody, of which the use is common to all, and of which the enjoyment is regulated by the police laws;" and the administration grants a proprietor the right to back water into the channel in front of lands above him, by means of his dam, so long as he does not injure or endanger the lands in any way, take away from the efficiency of other works above, or endanger the public interest. Here again was a step towards the abolition of the exclusive and complete riparian control of the stream, and a movement towards a declaration of public ownership of the channels themselves.

And thus the matter stands. The riparian proprietors still monopolize, to the extent of their necessities for all purposes, the right to use the waters from streams of this class. In this respect they have an exclusive and complete right as against all comers, except "public utility," "public health," and "national welfare," and except in cases where there is a surplus of supply over and above enough for their necessities, in which case the government undertakes to dispose of such surplus.

"To exercise the right of irrigation, it is necessary to be a riparian proprietor. If, then, a water-course comes to change its bed, the ancient proprietors, who are no longer on the new bed, no longer preserve upon it the right of taking water for irrigation, nor, consequently, of making constructions destined to conduct the waters upon their properties."—[Dalloz, Vol. 40, word "Servitudes."

The administration, representing the whole people and the nation, by virtue of its police powers and its guardianship of public property and public weal, exercises a control over the streams, a regulation of all works placed in the streams, and a surveillance of all use made of the waters.

Nature of the Riparian Right, and Tendency of Interpretations.[1]

The nature of this riparian right to water on non-navigable streams in France may be a little difficult to comprehend. It

[1] See, particularly, De Passy, pp. 23, 24, Dumont, pp. 171–208; also, Dalloz, Vol. XIX, pp. 379–390, and *Les Annales des Ponts et Chaussées*, Vols. Laws and Decrees (recent).

is so far a right to have the water left in the channels that the administration (on the ground of "police regulations," "sanitary provisions," or "public utility") may refuse to sanction the construction of a work for diversion, which has not proper provision in the way of sluice-gates to let water enough go on down stream, at the driest times, for domestic purposes of all bank owners below; nor will it at all sanction the construction of a dam, when it clearly appears that owners below will be deprived of needful water by its effect, although the projector be a riparian proprietor and has a right to water under the code.

And yet, there is no element of the principle of prior appropriation—first in time first in use—about this right. The code dedicates these waters to the use of him "whose property borders on," or, "whose estate is intersected by such waters." It is only in the regulation of affairs by the courts and the administration that any recognition of priority of right is found, and even then, in the supervision of the use, the principle is not closely adhered to.

The code merely gives every riparian owner a privilege of using the water. There was no direct recognition and confirmation of old and established rights in this connection, although many such existed; nor any rule laid down except that "in all cases particular and local regulations on the course and use of waters must be observed," and that "the interest of agriculture" must be reconciled "with the respect due to property."

And yet this riparian privilege is so far a right to take water out of the stream, that, though fully used, the courts can recognize a right for a new water privilege, and the administration may sanction the works necessary for availing of it, and, in the course of the division of waters, the new work will get its share. This rule, however, would not be carried so far, presumably, as to deprive any prior user of water, of all he actually required to accomplish his purpose, but it would force him to economize in his use. No matter how old a privilege may be, the administration, in the public interest, has always the right to turn sufficient water past the dam to satisfy the personal wants of proprietors below, and thus guard against unsanitary results; and it can even compel the construction of a sluice-way in the dam, to be used for this purpose.

The Right of Irrigation—Absorption of Water, etc.[1]

For many years after the promulgation of the code it was held that the obligation imposed upon the riparian proprietor of "restoring it (the water) at the boundaries of his field to its ordinary course," after use, as set forth in the second paragraph of article 644, applied as a condition to all use of water allowed by the article, and, hence, there could be no material loss by absorption in irrigation. The irrigations in France at that time were very generally those of meadow lands situated closely along the stream borders, and a very large proportion of the waters led on to them flowed off again.

The court of cassation (Supreme Court of France), in 1844, August 21, rendered a decision on this point as follows:

"Running water is regarded by the law as a common property. Riparian proprietors on a water-course naturally have equal rights to the use of the water, although they cannot exercise this right simultaneously. If on account of the advantage of its topographical position the proprietor of higher land on a stream, exercises his right before the proprietors of lower lands, he is not the less obliged by this position after having used the waters, in the interest of agriculture and industry, to return them to their usual bed, in order that the proprietors of lower lands may use them in their turn.

"When the proprietor of the higher land possesses at the same time both banks of the stream his right is more extended; he can then turn the water-course from its bed within the extent of his domain, and take the waters for use where he wills on his estate, being obliged to return them to their ordinary course where it leaves his property. This proprietor will not have to return the same quantity of water which he has received, or any certain quantity of water determined, but he must economise and use water in a just measure so that the proprietors of lower lands may exercise their rights also."—[Decision—August 21, 1844.

Again, in a decision rendered in 1847, the same court decided that an upper proprietor, no matter how extended his estates on both banks of a stream, had not the right to absorb all the water on his lands, to the detriment of a lower proprietor, and that the lower proprietor had a right to a regulation whereby he would be

[1] See, Dumont, De Passy, and Dalloz, as already cited; but particularly, late volumes of Laws and Decrees of *Les Annales des Ponts et Chaussées.*

assured a part of the supply, in accordance with his needs and rights as adjudged by experts.[1]

The Question, one for Equitable Administration.

De Passy, writing in 1878, and a semi-official book for the information of the members of the national hydraulic service, as well as for general sale, says:

"An obligation on the irrigator to return the water when it leaves his lands, to its natural channel, does not result from article 644 of the Code Napoleon. That article comprises two paragraphs, distinct and independent from each other; the first regulates the right of irrigation, which may be exercised by the proprietor of one bank; the second recognizes in the proprietor of both banks more extended rights, such as industrial use, etc.; and it is as a restriction on these last rights, and in the second paragraph only, that is written the obligation to return the water upon its exit from the lands traversed, to the natural channel."—[De Passy, p. 50.

As a matter of fact, the streams are controlled, and the waters apportioned out to those who have claims on them, by administrative regulations. Economy in their use is enforced, according to the experiences of the country; so that the question is kept out of the courts more than it used to be, and the courts recognize the fact that they can make no decision that can settle the point on principle, or even in any particular case, for all contingencies that arise. The later decisions are not decisive as to principle; they lean towards the view above quoted from De Passy, speak of "returning the drainage and residue of the waters," only, to their natural channels, uphold ancient customs in the use of waters, but enforce administrative regulations that look towards economizing it, and other measures in the public interest.

SECTION II.

Supervision of Construction of Works.

Decentralization of the Administration.[2]

By an imperial decree made in 1852, and interpreted by a number of decrees of the council of state of later dates, a portion of

[1] Decision—July 8, 1847. See, *Les Annales des Ponts et Chaussées*, Laws and Decrees, 1847.

[2] See, De Passy, preface, and elsewhere.

the authority theretofore expressly reserved to the ministers and council of state in matters pertaining to the regulation of watercourses, was delegated to the local departmental administrations.[1]

This transfer of power constituted what is known as the decentralization of the administration in the hydraulic service. By it much more responsibility has been thrown upon the engineers, seeing that the scope of their duty has been widened, and some other inquiries being done away with, those which they make must necessarily be more searching, and there being no certain revision of their opinions by a higher central body, their views must be more firmly grounded on good judgment. The law, however, provides a right of appeal from the decrees of prefects and opinions of the engineers, so that parties being aggrieved at a result may take their case immediately before the minister of public works, or even the council of state for revision.

Powers and Duties of Local Administrations.[2]

The prefects of departments have the power (1) to authorize upon non-navigable and non-raftable streams, the building of all new works necessary for mills, manufactories, dams, headworks for irrigation, etc.; (2) to regulate the existence of such establishments where already constructed without formal permit and regulation; and (3) to modify existing rules concerning such establishments already built. In these cases the prefects act directly, by simple resolution, without the special intervention of the minister of public works, but upon the opinions and advice of the chief engineers of the departments, and in conformity to the general ministerial regulations and circulars of instructions.[3]

They also have the authority to carry out ancient rules and local usages in the matter of the division of waters, from streams of this class, between the various interests employing them.[4] But in the absence of ancient rules and local usages to serve as a basis for such prefectorial regulation of the division of waters, and especially between antagonistic interests such as manufacturing and irrigation, the prefects have not the authority to act, but such regulations must emanate from the council of state by decree.[5] Hence, the

[1] *Decrees*—March 25, 1852; April 15, 1861; August 23, 1867; March 18, 1868. *Law*—June 21, 1865.
[2] See, De Passy, pp. 14, 15, 60–68, 73, and elsewhere.
[3] *Decree*—March 25, 1852.
[4] *Decree*—April 15, 1861.
[5] *Decree*—August 26, 1867.

prefects can authorize the works necessary for an establishment, but cannot, in apportioning water to it, alter or amend existing regulations concerning the division of waters, so as to affect the interest of others, or the public interest, or change "local usage" in this regard, to the prejudice of third parties, unless there is in existence some "ancient rule" applicable to the case which authorizes the setting aside of such "local usage" by the prefect.

Nature of the Power held by Prefects.[1]

The authority of the prefects in the matter of regulating water-courses and waters is confined to the authorization of works, and to the execution and adjustment of details of decrees regulating the distribution of waters, and the application of ancient rules and local usages. The first power is that of authorization, all the others are in the nature of police powers. Hence, except in the one class of cases mentioned (the authorization of works on non-navigable water-courses), all the regulative measures of prefects are based on police powers, and limited by the ideas of public safety and welfare to be attained by such measures. The police power is not to be confounded with the power of authorization. The right to adopt and carry out measures in the interest of public health, a police measure, for instance, has always belonged to the prefects.[2]

"The nature of police measures consists solely in securing a respect for the public interest, in calling on each person for the execution of his obligations, for the cause of the right and the good of all."—[De Passy, p. 70.

The original declarations of authority, under which these powers of regulation are exercised by prefects, is found in laws of 1790 and 1791, and a resolution of 1799. The first law charges the administrations with the duty of "seeking and indicating the means of procuring the free course of the waters of streams, with a view of preventing the plains from being submerged by the too great elevation of milldams and of other works established on the rivers, and of directing, in fine, all the waters of their territory towards the one object of general utility in accordance with the principles of irrigation."

The second law imposes upon the departmental administration

[1] See, particularly, De Passy, p. 15, and elsewhere; Dumont; also, De Buffon.
[2] *Decree*—March 18, 1868.

the duty and authority to fix the height to which dams may be built in streams, so as "to hold the waters at a height which does not injure any one," or in any way "interfere with the public interest or convenience."

And the third law delegates "to the administrations of departments the power of taking all the necessary steps to prevent waters being turned from their natural courses by works of diversion, simple ditches, or otherwise, without previous authorization; and, also, the power of seeing that dams, embankments, and other works do not exceed the level which will have been fixed for each."[1] The duty of prefects in this connection is sufficiently apparent from that which has been said respecting their authority and power, and from what is said under subsequent headings in this chapter.

Applications for Sanctions to Construct Works.[2]

In cases where water is to be taken from a stream without constructing a dam, by a simple cut in the bank, with a headgate, permission from the administration to construct the work is not necessary, for it can only interfere when the flow of the stream is to be checked by a dam,[3] but the owner of the proposed structure must establish in the courts his right to water, if this be contested, and the construction afterwards comes under the supervision of the administration in carrying out regulations for all diversions and uses on the stream. But in the interest of the public the administration may cite parties proposing or executing such works to appear in court and prove their right to water and that they will not destroy interests already grown up.

Whenever a work is to be constructed in or on the bank of a non-navigable stream, which will or may affect its régime as a drainage way of the country, or which may directly affect the common rights or public utility subserved by the stream, sanction of the plans and project must be had from the departmental authorities. Application must be made to the mayor of the commune, the sub-prefect or the prefect, for the permit, and this application must be accompanied with a plan of the proposed work, a statement as to its purpose, etc.

[1] Resolution of the government, 19th Ventose, year 6.
[2] See, particularly, De Passy, supplement, and Ch. I; also, Dumont.
[3] The latest regulations of the administration conflict with this doctrine. See Article 6 of the form of regulations at end of this chapter.

The mayor publishes this application by posting it as directed by regulations. He hears and records the substance of all comments or objections, and he transmits the statement of the case to the sub-prefect. This authority after consideration reports the case to the prefect, who submits the question to the departmental engineer on the special service.

The engineer examines the matter to see that the works are such as will not bring harm to the stream, and in conformity to general regulations. He may prepare other plans to effect the same purpose, and recommend them in place of those contained in the application. These results with his opinion are reported to the prefect, who may order a further investigation of the whole matter by the sub-prefect, or may thereupon act by granting or refusing the application.

To every such permit conditions are attached, binding the grantee to construct the work according to plans or to modifications thereof, to be approved by the local administration, and binding him to submit to local regulations in the management of the affairs of the stream, and to keep his work in repair.

Determining the Legal Height of Dams.[1]

Dams for water-power purposes, and intended to hold the water at all times materially higher than the bed of the stream, are put in solidly from bank to bank, up to the least height at which it is necessary to hold the water for the purpose required, when the bank-lands above are sufficiently high to be well above the flood plane as necessarily raised to higher levels by the effect of the dam. But when these lands are not naturally high enough to admit of so high a flood plane, the top portion of the dam, for such height and length as may be necessary in each case, is made removable, automatically or otherwise, so as to admit free passage of floods through the weir thus opened, without their rising above a certain safe elevation in the reach above the work. These weirs can but seldom be dispensed with.

In the issuing of permits for the construction of water-power dams on non-navigable and non-floatable streams, it was, until within the past fifteen or twenty years, the rule to restrict their heights so that the backset of waters would be confined to the

[1] See, particularly, De Passy, pp. 19, 23–25, 28, 51, and elsewhere; also, Dumont.

limits of the lands owned by the proprietors of the work, upon the theory that the bed of the stream was private property, and nothing could be done to affect it without permission from its owner. But the supreme court of France, and the council of state, have finally determined that "the fall of a stream of this character is not the property of the land proprietors, but that it enters into the class of things which, by the terms of article 714, Code Napoleon, do not belong to anybody, of which the use is common to all, and of which the enjoyment is regulated by the laws of police," and hence the administration sanctions works which cause water to be held back in the channels through properties above, so long as neither these lands nor other works are thereby injured.

In cases where it is necessary, in order to get head sufficient for the intended purpose, and at the same time guard against overflowings of land above, the administration is authorized to provide for the necessary levees on each side of the stream above the dam, to be built at the expense of the owner of the dam; all costs, charges, and damages being met by him.

The legal height having been determined for a dam, as a matter of record, and for reference at any time, a stone slab or shaft is firmly embedded at some convenient point, near at hand, where it can be conveniently got at, and so that its top surface is at the elevation of the dam's crest as authorized to be made. Thus the officers of the administration, or any one else, may at any time test the fact as to whether or not the dam has been made higher than authorized. This reference monument is an official record, and not to be displaced under pain of severe penalties, and the owner of the dam is responsible for its keeping.

Construction and Maintenance of Dams and Headworks.[1]

For convenience in making the proper clearances of the beds of the stream above the dam, and to provide the means for the passage at all times of water in sufficient quantity to satisfy the rights which lower riparian proprietors have, sluice-gates are put in all dams not built removable, at a point near to or at the level of the natural stream bed. Should it appear to a prefect in considering application for permission to put a structure for manu-

[1] See, De Passy, pp. 24, 25, 51–54, and elsewhere.

facturing purposes on a stream, that rights of riparian proprietors already availed of would be seriously injured by it, he has authority on this ground to refuse the permit—the waters being already fully utilized and required for use under the code. The courts may order otherwise, however.

Permanent dams for diversion of waters for irrigation must be removable down to the plane of the natural bed of the stream, for a length as great as the natural width of the stream between banks when cleaned out, and cannot be used for power-head purposes, and be kept closed all the time. The movable portion must be composed of shutters which fall flat on to the bottom, of gates which may be raised above the flood plane, or of stakes ("needles") which can be taken out altogether.

The crest of the movable portion, like that of the fixed portion, must be adjusted to the plane of the legal height determined for the dam, and its sill must be established at the level of the bed of the stream when at its ordinary plane. Scouring sluice-gates are not required in dams of this character, for the clearances above are effected by opening a portion of the dam itself down to the scouring plane. Closable top weirs are also not required in dams of this kind, for a portion of the whole dam may be used for flood escape.[1]

The dimensions and form of the head-gates of the canal, the elevation of their sills with respect to that of the top of the dam, the form and slope of the channels for a certain distance below, are regulated with the view of receiving the full flow of the water from the stream at low stage, when the division among claimants on the stream is made by giving each the full flow in turn at stated intervals, and, at the same time, to properly gauge a much smaller amount, when the division is made by apportioning the supply at once amongst a number, or all, according to their rights.

[1] Instructions, October 23, 1851.

SECTION III.

Regulation and Operation—Works and Waters.

Necessity for Regulations and Administration.[1]

In early years of social and political development, the necessity for guarding the common property of all the people is not felt. Each individual is intent on securing his own advantage, and all lose sight of those mutual interests which cannot be segregated and cut off from the common stock as can lands and most personal properties. Water-courses and waters are, by nature, that kind of property which no one can own, yet it has always been the idea in the early stages of the development of a people or a country, that each person might use these common properties as he chose.

It was so in France. In the struggle for control of the navigable and raftable streams, which for centuries went on between the central government of the country and the nobles and the provincial governments, as I have already written, the small streams not raftable were left to the control and use of the riparian proprietors, the government maintaining a nominal and fitful supervision over them in the interest of public utility and the protection of navigation interests below. Thus, customs were established which in course of time became flagrant abuses. So long as interests were few and water plenty in comparison to demand, and the stream banks were not much occupied, so long was there no pressing need of regulation other than that established by local custom and agreement.

But as time wore on, it was found that the courts were overwhelmed with water-right and other similar litigations. There was a perfect sea of trouble. The more decisions there were, the less were the people satisfied with the results. It was found that water was used in the most extravagant and useless manner, and purposely or carelessly wasted by those who for long periods had enjoyed its control, while others equally well entitled to it originally, were deprived of a participation in its benefits.

The government was appealed to on all hands to make new laws, and indeed some legislation was brought about by this

[1] See, Dumont, De Passy, Dalloz, De Buffon, and Malapert.

pressure and popular clamor. But after awhile it was found that enunciation of principles, and formulation of general laws, and multiplying of rulings, without judicious and wise application of them according to local and the ever varying circumstances, did not effect the desired ends.

Recognition of the Necessity for Administration.

In the meanwhile it had become necessary for the government administration, in the interest of the public welfare, to interfere in some of these local quarrelings; and the salutary effect of these interferences became known and appreciated, seeing that regulation did away with litigation, and that the best was thus accomplished for all, with the advantages at command. This led to the administration being called on in other cases, to establish special rules and regulations on other streams; and so it has come about that on nearly all streams of any importance as sources of water supply for any purpose, or where their banks are built on, or where they run through municipalities, or are embanked to prevent floods, there are special regulations applicable to the cases which arise on them each.

It cannot be said that this system has been always acceptable to the people, or that it has not in places awakened violent opposition; for there has been opposition to administrative authority and control, and appeal taken to the courts. But the outcome is one of satisfaction with the principle on which rests the system, although, no doubt, the means of its application may not always be acceptable, and the results not always for the best.

Writers on these subjects of irrigation and drainage and the like, in France, with one accord unite in setting forth the necessity for a supervision of the affairs of water-courses. Speaking of the diversion of water from, and construction of works in non-navigable streams, M.M. Dumont, being themselves advocates of the rights of riparian proprietors to control such streams, say:

"An unlimited freedom in this regard would be most dangerous. The privilege would be abused by some to the detriment of that of others, and of the public welfare. We must admit that if there were no regulations, every one could do as he chose, or use such quantities of water from the river as he willed, because of this privilege, and it would engender a veritable anarchy, and even lead to annihilation of law itself. There have been quarrels between irrigators and irrigators, and between these and factories, and these

rival interests, not regulated, have been completely paralyzed, and all their advantages from a fair distribution of the water have been, in these cases, sacrificed."

"Therefore the exercise of the right of diversion from small running streams is and must be subordinated to certain conditions of general interest. In such matters the law cannot foresee all contingencies or regulate all cases, for what is good for one river is not good for another, and what is good for one season is not good for another. Hence all latitude and power is given to the administration in the exercise of its duty of improving and regulating the affairs of water-courses, to direct and manage them with the view to general utility, taking cognizance of the principles of irrigation."

"The courts themselves are required to conciliate the interests of agriculture with respect due to property, whenever litigation occurs between proprietors on these streams, to whom waters may be useful, and it has been expressly laid down for them that in every case they shall observe all particular and local regulations on the course and usage of water. The administrative regulating power, which is called upon to exercise so great an influence on the prosperity of agriculture, should rule over all water-courses, however small they are, even the waters of a brook fed by an intermittent spring."

De Buffon has written much in this same strain, and I have heretofore quoted from him, under a former heading, some strong sayings on the necessity for guards in carrying out regulations on the rivers. In another place, speaking of the bad condition into which channels have fallen for want of regulating their use, and the use of their banks, he says: "In the absence of rules of maintenance such a state of affairs is allowed to grow worse and worse during a number of years, and it will become intolerable, for a great extent of the riparian property will little by little lose its value, and other interests will be lost, because of conflicting and indeterminate claims."

"This is why a great number of localities are now suffering continually increasing injuries caused by the bad régime of these water-courses, and for that reason, in nearly every locality so affected, complaints are heard and demands made for the adopting of proper regulations and police measures to make an end of such a vexatious state of things. The superior administrative authority is continually solicited to favor the promotion of syndicates to act in concert with local administrations to insure the common good from the water-courses."

Administrative Authority to make Regulations.[1]

The authority of the central administration to make general and particular regulations governing the affairs of non-navigable streams is a power born of the natural necessity for regulation in the use of a property common to all the people, and of the recognized duty of government to foster the common interest, promote the general welfare, and protect the public rivers below, by establishing order in and imposing conditions on the diversion of waters from the tributaries above. Hence, the origin of the authority of the central administration is not found in any laws or other enactments, but its duties are inferred from the laws and decrees relating to the subject and governing the action of the departmental administrative officers, and which have been already quoted.[2]

The duties with which we have most concern are those of "seeking and indicating the best way of utilizing the waters of all streams in irrigation," and others, which are of police nature, in repression or prevention of individual license exercised to the detriment of common and public welfare. The article 645 of the Code Napoleon modifies the power of the administration to interfere as between private rights to water on non-navigable streams, by relegating such questions to the courts. But these questions as to right being settled thus, or by long established usage, it remains for the administration to order matters from day to day and year to year, in accordance with the basis thus established, and with the view of the public utility of the streams.

In cases where, under long established use, rights to definite quantities of water have become settled, the administration cannot do otherwise than recognize these rights, and establish regulations for the apportioning of the supply, in conformity with such claims. Should all the rights be not already established by long use, the administration can only propose an apportionment, and, if this is not acceded to by the parties at interest, the case must be adjudicated before the proper courts, and then the administration establishes its regulations on the basis of the court's decree.

The administration has taken the authority to determine, however, the total volume of water which may be diverted from a stream, for irrigation, as against the demands of navigation and

[1] See, De Passy, Dumont, and Dalloz.
[2] See, "Powers and Duties of Local Administrations," *ante.*

manufacturing on the river below, and of deciding the dimensions of the head-gates, etc., to take this water, and the periods of time during which it may be taken, and the court of appeals has sustained the acts of the administration in this respect, as being equitable and not in excess of authority.

When rights have been settled by long established usage, or by the courts, the prefects have the authority to establish regulations, in conformity with the schedule of rights thus fixed, defining the time, manner, etc., of use for each claimant, whether irrigator, manufacturer, or commune, and according to existing circumstances.[1] But, if no settled rights exist, regulations always emanate from the council of state in general assembly, for to the sovereign authority belongs the right to settle matters so nearly affecting the general interest.

"From these principles as to authority, it follows that in the absence of long established and recognized custom and local usage, and in cases where it becomes necessary in the general interest to modify such practice, there is no other provision for a division of water in this class of water-courses among the several users, but a decree emanating from the council of state in general assembly."—[De Passy.

Principles Adhered to in Making Regulations.[2]

In cases where a division of water is to be made between agriculture and industrial pursuits, the points to be fixed are of two kinds—those special to each particular case and those common to the whole set of cases.

The special points are the following: (1) During what periods is it necessary to have water for irrigation: first, for the spring waterings, and, second, for the watering of summer crops; and on what days, and at what hours during each of these periods, will it be necessary to have the water. (2) In what divisions of the stream do groups of distinct and separate interests lie; what is the extent of interest in each division; what of the whole available water supply reckoned in days and hours will be required in each division; at what times will each division demand its proportion; and what is the constant demand in each division for water for domestic purposes.

The general points are as follows: (1) The waters set aside

[1] Decree of April 13, 1861.
[2] See, De Passy, Dalloz, and Dumont.

for manufacturing power purposes, are after use or when not used, accorded to irrigation without regulation, unless the considerable number of interests on the stream below makes a schedule necessary to preserve order in division. (2) The gauging, rating, guarding, and operation of the headgates of canals and sluices, and of the weirs and open ways of dams, is the subject of a general regulation. (3) The making of a general schedule for division of waters, and of a special card therefrom for guidance in the use of waters at each manufactory and by each irrigation canal, is the subject of a general regulation for the stream. (4) The reservation of waters for purposes other than those specified in the schedule, in the interest of the public generally and parties using water from the stream for other purposes than irrigation and power, is the subject of a general regulation for the stream. (5) The distribution in irrigation by the irrigators themselves, of the waters allotted to them in each case, and provision for citing them before the courts to have their matters of dispute settled, under article 645 of the civil code, so that water be not wasted, while they are quarreling, is the subject of a general regulation for the stream.

A type of public administrative rulings for a division of water between agriculture and industrial pursuits, is the decree dated July 2, 1872, relative to the river Furè in the Department of Iserè, hereinafter given, under the head of "Regulations of Irrigation," on the second page forward.

General Rules as to Division of Waters.[1]

In the issue of permits to construct dams for irrigation in water-courses of this class, a special obligation is imposed on the owner of the work, that the water passage shall always remain open, and thus a free flow of the stream on its natural bed be assured, except when the water is being diverted into the canal as provided for in the schedule of division. This specification is necessary to guard against floodings above the dams, and to insure a fair distribution of the waters according to the schedules, and to allow the stream to keep itself clear from deposits caused by the dams when closed; and the necessity for it has been made glaringly apparent by a long and disastrous experience with dams not provided with open ways.

[1] See, De Passy; also, Dumont, and Dalloz.

In cases where the water volume in the stream to be divided is sufficient to admit of all claimants receiving adequate irrigating or power-heads at once, the schedule is made on this basis—of a division of the flow; but if the supply is not sufficient for this purpose, the system of "turns" by the day, week, or hour is adopted, and the schedule is so arranged as to accommodate, under this arrangement, as many as possible with the supply available. The system of turns is preferred by the administration as well as the irrigators, because the supervision has then only to be directed to fixing the time for opening and closing the headgates and dams and not also to the regulation of the amount they shall admit. But this system has the disadvantage often of not allowing the waterings to be made when the crops most need it.

The administration, in making schedules for divisions of water, is governed by ancient local custom, probable water supply, and as far as possible by the necessities of each individual water-right holder; so that in reality it only acts as a disinterested third party apportioning a common benefit, as far as possible to suit desires of the parties most at interest, and reserving and caring for the rights of other parties at interest, much scattered and not otherwise represented. In authorizing the construction of a new work by a party having a riparian right to water, the prefect, representing the administration, if there are well established general rules or customs governing water division on the stream, inserts a clause to the effect that the new work is to be used in conformity to such rules as carried out by the administration or the consumers amicably amongst themselves.

In the absence of ancient rules or customs the prefectorial order is limited to authorizing the construction of the work, leaving for the future the determination in the general interest, of conditions under which the new work is to be used, if it should be needful so to do, or, if this becomes necessary also, awaiting the action of the courts in determining the relative rights of the parties at interest. Thus, questions relating to the actual right to water, the relative extent of each claim to water, the right to partly or wholly support a dam on another's land, the right of way to conduct water over another's land, the point at which drainage waters shall be returned to the streams whence the head is derived, and, in a word, all questions relating to each individual claim are, if necessary, first to be adjudicated by the courts, and the administration bases its regulations on these decrees.

Regulations of Irrigation—Division of Waters between Claimants.[1]

As a practical example of an administrative measure regulating the division of waters between agriculture and manufacturing and other industries, the following decree of the president of the republic, dated July 2, 1872, is given in full. It will be understood, of course, that the waters, except when being used, as specified, in irrigation, are to remain in the channel for power generation at the dams devoted to other purposes than irrigation:

"The president of the French republic, in view of the decree of the 5th May, 1865, declaring to be of public utility the works for the management of the lake of Paladru, intended to supply, for all time, to the river of the Furè the volume of water sufficient for the necessities of irrigation of the river meadows, and the working of numerous manufactories which exist on this river:

"In view of the reports of the engineers of the department of the Iserè, relative to the measures to be taken to do away with the abuses proceeding from the absence of schedules regulating the use of water:

"In view of the documents of the two inquiries opened by prefectorial judgments of 4th November, 1867, and 18th May, 1871:

"In view of the opinion of the commission of the syndicate of the Furè, in date of 10th October, 1870:

"In view of the uniformity of plan of the valley of the Furè, and the proposition of the proprietors of the irrigated meadows:

"In view of the reports of the engineers in date of 16th February and 31st May, 1870, 19th November, 1871, and 29th February, 1872:

"In view of the opinion of the prefect in date of 13th March, 1872:

"In view of the opinion of the general council of bridges and roads in date of 27th March, 1872:

"In view of the laws of 12–20 August, 1790, 6th October, 1791, and the judgment of the government of 19th Ventose, year 6, the decree of decentralization of 13th April, 1861:

"And the temporary commission, charged with replacing the council of state, being heard, renders judgment as follows:

"Article 1. From 1st March to the 1st September, each year, the meadows which have the right to the waters of the Furè, on the territory of the seven communities of Charavines, Apprieu, Saint Blaise de Buis, Beaumont, Rives, Renage, and Tullins, will be irrigated once a week.

"*First*—The meadows included between the source of the river and the dam of headworks of the furnaces of Riviere, a point situated at 2028.50 metres down stream from the bridge of the

[1] See, De Passy, Appendix No. 1.

departmental road No. 7, from Sunday at one o'clock in the morning till Sunday at half-past seven in the evening.

"*Second*—The meadows included between the dam or headworks of the furnace of Riviere and the mouth of the stream of Reaumont, in the Furè, from Saturday at nine o'clock in the evening till Sunday at half-past seven in the evening, to wit: from Saturday at nine o'clock in the evening till Sunday at one o'clock in the morning, with the total discharge of the stream, and during the remainder of the time, with the product of the waters of filtration, proceeding from irrigations up stream, and that of the tributaries which fall in this part of the bed of the Furè.

"*Third*—The meadows included from the mouth of the stream of Réaumont, and the end of the course of the Furè, from Saturday at six in the evening till Sunday at half-past seven in the evening, to wit: from Saturday at six in the evening till Saturday at nine in the evening, with the total discharge of the water-course, and during the remainder of the time, with the product of the waters of filtration, proceeding from the irrigations up stream, and that of the stream of Réaumont, as well as the tributaries which fall in this part of the bed of the Furè.

"Article 2. The proprietors of the meadows will have, nevertheless, the power of practicing supplementary irrigations, when there are superfluous waters, that is to say, when the manufactories are working regularly, and the river affords an excess of discharge, it may be passing across the sluices of discharge, raised for this purpose by the manufacturers, or it may be by accidental flowing over the weir.

"The irrigators can open their headgates, but on condition of closing them, as soon as the water of the river will have descended to the legal level of the dams, the sluices of discharge being closed.

"Article 3. Outside of the fixed hours for irrigation, by article 1, and except the case of use of superfluous waters, under the conditions provided by article 2, the sluices of the irrigation dams existing, it may be on the Furè, it may be on the millponds taken from this river, will have to be completely raised above the level of flood waters, and the sluices of the headworks will remain tightly closed.

"The proprietors, having, in virtue of titles legally recognized, a right to a continuous small stream of water, it may be for their domestic uses, it may be for feeding their retting pits, will be able at all times to preserve in their respective headgates the openings necessary to receive the continuous volume of which they have the right of enjoyment.

"Article 4. In the regulating schedules for the works intended to assure the irrigation of the meadows, and the régime of the manufactories, the prefect will fix the conditions, which he will judge necessary, with the purpose of maintaining the division of the waters made by the present decree.

"Article 5. The rights of outside parties are and continue expressly reserved.

"Article 6. The irrigators will arrange between themselves for dividing the waters placed at their disposition, and will carry all disputes which may arise from said division of waters, before the competent authority.

"Article 7. The minister of public works is charged with the execution of the present decree."

Regulations of Streams—Police and Cleansing of Water-Courses.[1]

As a practical example of the regulations of police of non-navigable water-courses, the following formula promulgated in 1878, as a circular, to the local administrative officers, by the minister of public works, is presented. It is explained that this is intended as an outline to be followed by the prefects in getting up general regulations for the streams in their departments:

"*Obligations of the Riparian Owners.*—Riparian owners are to lop off and remove all trees, bushes, and stumps which might form an obstruction on the banks of the water-course, and all the branches, which, touching the water, might impede the flow.

"*Silt Accumulations.*—Riparian owners are obliged to receive on their lands the materials coming from the cleansings of the channel, and to remove the deposits which would injure the free flow of the waters.

"*Passage of Riparian Properties.*—The riparian owners are obliged to give free passage over their lands, from the rising to the setting of the sun, to the officers and their agents in the discharge of their duties, as well as to the foremen and workmen charged with cleansings of the streams.

"These persons cannot, however, use the right of passage over closed lands, except after having previously notified the owners.

"In case of refusal they will require the assistance of the mayor of the community. They will be responsible, besides, for all damage or injury committed by them or their workmen.

"*Construction.*—Every proprietor who wishes to make a structure, or a change in any structure, upon the water-course, or adjoining it, must submit to the prefect the plan of the work he proposes to adopt.

"In the two months which follow the deposit of this communication, the prefect, after having taken the advice of the engineers, will make known to the petitioner if the projected works would appear to injure the free passage of the waters, and if, in consequence, the administration is opposed to their execution.

"After this delay, if he has not received any response, the peti-

[1] See, *Les Annales des Ponts et Chaussées*, Vol. CXXXIX, p. 1112.

tioner can go ahead, without, however, prejudicing the rights of third parties, and those of the administration.

"No dam, plantation, permanent or temporary work, of a nature to modify the régime of the waters, may be established or repaired on a water-course without the authorization of the prefect.

"It is forbidden to make ditches in the banks, or practice any other means of derivation, without having first obtained the permission of the prefect.

"*Obligations of Manufacturers and Users of Dams.*—The weirs and sluices of discharge will always be maintained open, and it is expressly forbidden to place anything on them for the purpose of raising them.

"In default of an official ruling which fixes the legal height of the dam, the waters are not to pass over the upper part of the weir, or from the sluice of discharge with a head of pressure if there is no weir.

"Manufacturers and users of the dams will be responsible for the super-elevation of the waters, as well as when the discharge sluices are not raised to their full height.

"The manufacturers and users of the dams will be obliged to open their sluices for the execution of the works of cleansing, during the hours and days which will be fixed by the prefectorial decrees made upon the advice of the engineers.

"*Deposits and Injurious Waters.*—It is forbidden to make any deposits in the bed of a stream or to allow infectious or injurious waters to drain into it.

"The interdiction made by article 17 of the decree above viséd, 10th August, 1875, of fishing in the parts of streams of which the level would have been temporarily lowered, it may be by conducting the cleansings or any kind of works, it may be on account of the stoppage of the manufactories, is reaffirmed.

"*River Guards.*—There will be river guards organized and specially charged with putting in operation the present rules, provided that all the interested parties, or any certain number of them, have made an engagement among themselves to assure the payment of these agents, under the subventions which would be furnished by the state, the department, or the communities.

"These agents will be commissioned by the sub-prefect, and will be sworn before the tribunal of the district.

"Infringements of the rulings of the present law will be proven by means of statements drawn up by a river-guard, or by any other agent of authority who has qualified for this purpose.

"These statements will be affirmed within three days of their date, before the mayor or justice of the peace, either at the residence of the agent, or in the place of the offense.

"They will be viséd for stamps and registered fee, in the space of four days after the affirmation, and referred to the competent jurisdiction.

"A copy of each statement will be remitted by the agent who

will have drawn it up, to the mayor of the commune, who will certify to it and send it to the infringer, with the summons, if necessary, to cease immediately from damage.

"The present regulation will be published and posted throughout the extent of the department.

"Copies of it will be addressed to the engineer-in-chief, to the sub-prefects and the mayors charged, each one in that which concerns his business of overseeing and assuring the execution of the prescribed rulings."

AUTHORITIES FOR CHAPTER IV.

Dumont.—[Work cited as an authority for Chapter II.] See Book II, Chapters II, III, and IV.

De Passy.—[Work cited as an authority for Chapter II.] See Chapter I, pp. 14–130, and supplement, pp. 297–334.

Malapert.—[Work cited as an authority for Chapter II.] See headings, "Actual Republic," "Engineers," "Water-Courses."

De Buffon.—[Work cited as an authority for Chapter II.] See Vol. II, Part II, Sec. I, pp. 1–106.

Dalloz.—[Work cited as an authority for Chapter II.] See Vol. XIX, "Waters," Chapters IV, IX, and X; also, Vol. XL, title "Servitudes."

Les Annales des Ponts et Chaussées.—[Work cited as an authority for Chapter II.] See, particularly, Vol. CXXXIX, p. 1112 *et seq.*, and also the late volumes of "Laws and Decrees."

Civil Code.—[Works cited as authority for Chapter II.]

CHAPTER V.—FRANCE[4];

RIGHT OF PROPERTY IN SPRINGS, AND RIGHTS TO THE USE OF SPRING WATERS.

SECTION I.—*Ownership and Control of Springs.*
Absolute Ownership.
The Opposing Doctrine.
The Settled Principle.

SECTION II.—*Acquired Rights to Spring Waters.*
Public Use of Springs; Populations.
Private Use—By Title; Prescription.
Servitude Resulting from Dividing Estates.

SECTION III.—*Rights of Drainage and Other Rights.*
Natural Right of Drainage—Civil Code.
The Right to Dig or Bore for Water.

SECTION I.

OWNERSHIP AND CONTROL OF SPRINGS.

Absolute Ownership.[1]

The matter of the ownership and control of springs has been one full of contention in France; but it is now well settled by the provisions of the code, and the decisions thereunder. Article 641 of this civil code says: "He who possesses a spring within his field may make use of it at his pleasure."

It follows from this that "a spring is the exclusive property of him on whose land it rises, and is used in an absolute manner like the land itself. The owner may lead its waters over his land, change their course, collect them in ponds and reservoirs, cause them to be absorbed by the ground, or even suppress the spring itself, and his neighbors will protest in vain against being deprived of them."—[Dumont, § 127.

[1] See Civil Code, Articles 641, 642, 643; Dumont, §§ 127-129; De Passy, p. 21, and elsewhere; Dalloz, Vol. XXXVIII, p. 217, and Vol. XIX, p. 398; also, Proudhon.

The code, however, defines certain circumstances under which this control of springs is limited and qualified; the causes being—the necessities of communities for water for domestic purposes, the necessities of the state for water for purposes of navigation, and the rights which persons other than the owners of springs may have acquired to the use of their waters by purchase or by prescription.

The injunction laid upon the courts by article 645 of the civil code, which commands that "if a dispute arise between the proprietors to whom such waters may be useful," they, the courts, "in pronouncing judgment, must reconcile the interests of agriculture with the respect due to property," applies only to waters mentioned in article 644, namely, those of non-navigable and non-raftable streams, on the use of whose waters, in favor of riparian lands, a servitude is laid, and does not apply to the waters of springs. Hence, the courts have not the power to partition the waters of springs between the proprietors to whom they may be useful, as in the case of waters of small streams, and the administrative department has never attempted it as a regulation.

The Opposing Doctrine.[1]

This doctrine has been strongly opposed in France, however, and there are writers, and some decisions, which hold that the principle of compromise and judicial control, embodied in article 641, was meant for application in the case of springs, as well as in the case of small water-courses, and that hence the courts can, in the interests of agriculture in general, and for the benefit of local agriculturists in particular, prevent the unnecessary wasteful or selfish use of spring waters, as well as those of a stream by an owner on its banks, and compel a division of the water with owners of adjacent lands, if there is really more water than is necessary for the lands containing the source, and for the legitimate necessities of the proprietor.

The Settled Principle.[2]

The ownership and control of springs is so complete and absolute that, so long as the waters remain within the property where they rise, even though used for manufacturing, power purposes, or otherwise, the administration, which has such extended authority

[1] See, Dumont, § 128.
[2] See, De Passy, p. 21, and elsewhere.

in the regulation of the use of waters under other circumstances, can do nothing to interfere with the proprietor's use of these spring waters, "even though they be in sufficient volume to form a veritable water-course."—[De Passy, p. 21.

"With regard to springs which rise on the lands of an estate * * * they belong to the proprietor of the lands themselves. * * * The proprietor, then, disposes entirely of the spring, saving the rights which may have been acquired against him, and saving the sacrifices which the public interest may exact to the detriment of his right."—[Dalloz, Vol. 38, p. 217.

But if spring waters be led across or into property other than that containing the source, no matter though the using be for the benefit of the owner of the source, or for whatever purpose, such stream is subject to regulation, as in the case of others.

SECTION II.

Acquired Rights to Spring Waters.

Public Use of Springs—Populations.[1]

Private interests must always be subordinate to public interests, however, and on this account the owner of a spring cannot change the course of its waters when they furnish the necessary supply to the inhabitants of a commune, village, or hamlet. "The legislature has always held in view of the personal necessities of people rather than the requirements of agriculture, as necessary to the moral well-being of the nation."—[Dumont, § 130.

This servitude is sometimes burdensome upon the proprietor of an estate who may desire to divert the waters of his spring to some purpose useful to himself, and, hence, he has the right to claim payment from the community, unless the inhabitants have, by use for a due length of time, a prescriptive right to the water. "The amount of the indemnity is determined by the courts, who take into consideration the degree of injury proved by the proprietor, rather than the advantages reaped by the commune, village, or hamlet."—[Dumont, § 130.

"It has been decided that a spring existing in the land of an individual is presumed to be the property of a community of peo-

[1] See, Dumont, §§ 130, 131; Dalloz, Vol. XXXVIII, p. 217; Proudhon, p. 4.

ple when this community has had the continual use of it from time immemorial, for domestic and community purposes."—[Dalloz, Vol. 19, p. 217.

Government can also take possession of springs to feed canals for navigation, but on condition that it pay a just indemnity, as adjudged by the courts, and in conformity to the law for the condemnation of private property to public use.[1]

Private Use—by Title; Prescription.[2]

The absolute right of ownership in a spring is also modified by purchased titles, by prescription, and by the servitude set up by the division of an estate containing a spring. A purchased right to the use of the waters of a spring is evidenced by a deed or record from the owner or former owner of the spring. In cases of uncertain meaning to such documents, the courts adhere to the presumption that the owner of the spring did not mean to restrict his own use of the waters in the fullest extent necessary for his purposes, but only to give the grantee the right to control the waters at any time found running in the channel below.

"The right most commonly ceded to a third party, upon a spring, is that of drawing water, or that of leading water away from it. The servitude thus accorded is regulated by the principles of conventional servitudes. The concession of a right of leading out water does not prevent the proprietor from himself using the water of the spring for the wants of his property, but he cannot change the cultivation of his property in such a way as to absorb a greater quantity of water than he was using at the moment of the concession.

"He who has ceded upon his spring a right of leading out water, can cede another to another person, without the consent of the first cessionary, provided always that the waters thus divided amongst several cessionaries can still suffice for the wants of each; otherwise, the consent of the first cessionary will be needed. The owner of a property to which the servitude of leading out water is due, cannot, without the consent of him who owns the property which owes it, concede it to a third party, nor even use the water for another property, or for another part of the property.

"One can acquire a servitude of leading out water on a higher property, from which it is separated by an intermediate property or by a public road. In the latter case an authorization is necessary. There is a servitude of aqueduct on the intermediate prop-

[1] Law of May 3, 1841.

[2] Dumont, §§ 132, 133, 134, 139½; Dalloz, Vol. XL, title "Servitude;" Civil Code, Arts. 688, 689, 690, 691.

erty, and a servitude of leading out water on the higher property. The proprietor of the intermediate property cannot serve himself with the water which passes through his land, without the consent of his two neighbors who have treated for the servitude of the water-right."—[Dalloz, Vol. 40, word "Servitude."

A prescriptive right to the use of the waters of a spring is "acquired by an interrupted enjoyment of them during the space of thirty years; to be computed from the moment at which the proprietor of the lower field has made and completed the works apparently designed to facilitate the fall and course of the water within his property."[1]

The courts hold that the essential points to be established in proving this servitude are: (1) That the works have been established in a permanent manner, (2) and maintained for thirty years, (3) in a manner to constitute an adverse possession of the water to that of the owner of the spring, and, hence, in consequence of the last condition, that these works be attached to the tract wherein the water rises. "This last condition is not written in the law, but it is the meaning of it, and this point, which has been the subject of lively debate, is at present sanctioned by jurisprudence."—[Dumont, § 134.

"The second exception to absolute ownership in a spring, on the part of him who has it on his property, consists in the prescription which can be acquired of the right to use the water of this spring. Prescription in this case can only be acquired by uninterrupted enjoyment, during thirty years, counting from the moment in which the proprietor of the lower land has made and terminated visible works destined to facilitate the fall and flow of the water on his property.

"We will remark at first that the prescription does not apply to a simple right of drawing water; for that is a discontinuous servitude, and servitudes of that description are not acquired by prescription. It would be different with a servitude of this class which would have been acquired by possession before the publication of the civil code. The general principles of prescription receive here their application.

"Moreover article 642 establishes special rules of which the accomplishment is necessary in order that the servitude may be acquired by prescription. It is necessary in the first place that there may be works. In vain the higher proprietor would have allowed the lower property to enjoy peaceably and publicly the use of the waters; this would only be a simple tolerance which could not constitute a right."—[Dalloz, Vol. 40, word "Servitude."

[1] Civil Code, Art. 642; see, also, Articles 688, 689, 690, 691.

The Servitude resulting from Dividing Estates.[1]

There are cases wherein lower and other proprietors hold the right to use the waters of a spring otherwise than by purchase or prescriptive use for thirty years. Thus when an estate containing a spring has been subdivided amongst heirs, after having been held by one proprietor, and the waters used to the benefit of the lower lands, so as to result in a servitude, by the owner of all, the owners in common and co-heritors of the upper and lower part of the estate share the use of the waters after the division of the lands.

This servitude results from article 692, civil code, which is as follows: "The declaration of the father of a family is equivalent to a deed as regards continual and apparent servitudes." The rights of ownership and use of a spring may be restricted, but not annihilated by the servitude above named, and it rests with the courts to conciliate the several interests in such cases.

The rights above described, acquired by prescription and the "servitude of the father of a family," do not constitute property rights, either in the spring or its waters, but simple rights to the use of some portion of the water, according to the facts in each case. Thus, the possessor of the lands in favor of which such rights have accrued, cannot take water at such times, and in such manner, and in such quantity, as seems best to him. "Conciliating the right to use with the rights of the owner of the spring, the courts can decide that in the future he does not use the water but according to a measure which, in default of an amicable agreement, will be regulated in the courts, by experts." This duty of experting usually falls to the engineers of the administration in charge of streams.

SECTION III.

Drainage and Other Rights.

Natural Right of Drainage.[2]

Article 640 of the civil code reads as follows: "Inferior lands are subjected as regards those which lie higher, to receive the

[1] See, Dumont, §§ 134, 136, 137; Civil Code, Arts. 688, 689, 692.
[2] See, Dumont, § 129; also, Dalloz, title "Servitude."

waters which flow naturally therefrom, to which the hand of man has not contributed. The proprietor of the lower ground cannot raise a bank which will prevent such flowing. The superior proprietor of the higher lands cannot do anything to increase the servitude of the lower."

Under this article, waste waters from springs must be permitted to flow as they would naturally flow on to lower lands. If the ordinary clearing or cultivation of a field, or excavation for ordinary purposes other than those of developing a flow of ground water, causes an increase in the flow of a spring, or the breaking out of a new one, these waters must be allowed to drain away as though naturally started. The owner of a lower estate cannot, however, without due indemnity, be made to suffer the passage over his lands of waters caused to flow by excavations made for the purpose of getting a flow of water, or where it is well known a harmful flow will result, or by artesian borings.

The Right to Dig or Bore for Water.[1]

Article 552, civil code, reads as follows: "Property in the soil imports property above and beneath. The proprietor may make above, etc. * * * He may make beneath, all structures and excavations which he shall judge convenient, and draw from such excavations all the products which they are capable of furnishing, saving the restrictions resulting from the laws and statutes relating to mines, and from the laws and regulations of police."

In consequence of this article, ownership of land carries with it all above and under the soil, and which is attached to it. The application of this principle authorizes the land owner to make on his land any works or excavations he deems expedient for his purposes, even though they result in the cutting of subterranean veins of water that feed a spring rising upon the lands of a lower proprietor.

"The court of appeals has even extended this privilege to cases where such excavations would damage mineral water establishments belonging to the State, and it refused the administrative authority of the mayor of Vichy the power to render decrees to forbid such excavations. * * * The council of state has also sanctioned the same principle in a similar case."—[Dumont, § 138.

This natural privilege may be forfeited by agreement amongst

[1] See, Dumont, §§ 138, 139; and Dalloz, Vols. XIX and XL, words cited.

proprietors, so that one estate be bound not to excavate to the detriment of waters or springs naturally rising on another.

AUTHORITIES FOR CHAPTER V.

Dumont.—[Work cited as an authority for Chapter II.] See, Book II, Chap. IV, pp. 209-225.

De Passy.—[Work cited as an authority for Chapter II.] See, pp. 21, 22, and elsewhere.

Dalloz.—[Works cited as an authority for Chapter II.] See, Vol. XIX, title "Waters," p. 276, and elsewhere, and Vol. XXXVIII, title "Property," p. 217, and elsewhere, and Vol. XL, title "Servitudes."

Proudhon.—[Work cited as an authority for Chapter II.] See, p. 4, and elsewhere.

Civil Code.—[Works cited as authority for Chapter II.] See, particularly, Arts. 552, 640, 641, 642, 643, 688, 689, 690, 691, 692.

CHAPTER VI.—FRANCE[5];

THE RIGHT OF WAY TO CONDUCT WATER AND THE RIGHT TO ABUT A DAM.

SECTION I.—*Rights for Works of Public Importance.*
Condemnation for Works of Public Utility.
Way for Main and Secondary Works.
The Laws of 1836 and 1841.

SECTION II.—*Rights for Private Water-Ways.*
Servitude of Right-of-Way; Law of 1845.
Servitude of Right-for-a-Dam; Law of 1847.
Application of these Laws.

SECTION I.

RIGHTS FOR WORKS OF PUBLIC IMPORTANCE.

Condemnation for Works of Public Utility.[1]

The right to land or to occupy land upon which to locate a canal or other water conduit, with its accessory works and structures, is, according to circumstances, obtained in France either by acquiring title to the strip of land itself, or as a servitude or right of occupation and use for the specified purpose.

In acquiring title to lands for the location of works, the mode of amicable private purchase is always open, and is the only means of attaining this desired end until the project shall have been declared and recognized by law or decree as being of public utility or importance, when the properties may be condemned as for public use. This process of condemnation is carried on under laws of 1836, regarding local roads, and of 1841, regarding expropriation for purposes of public utility.

Expropriation, or condemnation of private properties for works of public utility, is accomplished through the action of the courts,

[1] See, particularly, *Les Annales des Ponts et Chaussées*, Vol. XX, pp. 203–217, and Vol. XII, p. 328, *et seq.;* also, Dumont.

which, however, can only order the condemnation after the declaration of public utility has been made, for each case, (1) in the special law or ordinance which authorizes the execution of the works for which the expropriation is required, (2) in the decree of the prefect which designates the localities of the tracts on which the works are to be placed (when this designation is not contained in the law or ordinance), and, (3) in the final decree in which the prefect designates the particular pieces of property, according to ownership, metes and bounds, which it is necessary to condemn; and such condemnation can only be made after due hearing of interested parties, and in conformity to process of law.

Great public works, such as national roads, railroads, basins and docks, canals, and the canalization of rivers, whether enterprises of the state, or departments, communities, or of particular companies, whether toll is to be charged in any way or not, or whether a subsidy of treasure is to be granted or not, or whether any part of the public domain is to be used or not, can only be executed by virtue of a special law, which can be passed only after an administrative inquiry has demonstrated the feasibility and desirability of the work, and a report has recommended it.

A central administrative ordinance is sufficient to authorize the execution of departmental routes, that of canals and branch railroads less than 20,000 metres in length, and of bridges and other works of less importance; but such ordinance must also be preceded by due inquiry, examination, and report on the project, in conformity with regulations formulated by the central administration.

With respect to the administrative and legal forms to be followed in the condemnation of properties for works declared to be of public utility, this law goes into minute details at great length, expressly defining and prescribing each step to be taken, under the following general headings: Administrative measures of inquiry preceding condemnation; effect of condemnation on mortgages and other similar rights; the rule of indemnification; the payment of indemnities; contracts of sale; and others not at all necessary to enumerate.

Way for Main and Secondary Works.

From the first part of this long law, it appears that wherever it is proposed to condemn property for purposes of public works, such as for right of way for a canal, there must first be a report from

the government engineers defining or recommending the proposed route, and showing the lands, etc., proposed to be taken in each commune or community. This plan is posted at the local mayoralty house, and advertised for inspection of all concerned. Thereafter, an inquiry is held by a commission to hear all objections, criticisms, or suggestions of change. On the result of the report of this commission, with the evidence annexed, the prefect designates the route to be taken and defines the properties it will be necessary to take for the work. Should it be necessary from the report of the commission to modify the plans proposed for the works, the subject must be referred to the central administration, and the prefect awaits its decision. The properties being thus defined, the question becomes one for the courts, according to the provisions of the law which follow under the headings already given.

In accordance with this law, whenever a canal enterprise of importance is to be authorized, so that the projectors may have the right of condemning private property for right-of-way or other necessary purposes of the work, there is a special law passed which declares the proposed work to be one of public utility, and entitled to the benefits of the provisions of the laws providing for the condemnation of private properties for public use. This method of acquiring right of way for great works of public importance is of ancient origin in French legislation, for although the particular acts cited are of comparatively recent date, they are founded on and are elaborations of others preceding them.

These provisions, however, applied only to rights of way for main works—those which could be recognized as being of public utility; and until 1845 there was no method, except by amicable private purchase, to acquire rights of way for the minor distributing ditches of great canal systems, nor was there any possibility of a private individual or of any organization acquiring a right to conduct water over lands against the will of their owner until the work had been officially examined and declared to be of public utility as above explained.

SECTION II.

Rights for Private Water-Ways.

Servitude of Right of Way.[1]

The passage, in 1841, of the law on the condemnation of private properties for purposes of public utility, which was really in some respects a reënunciation of laws already existing, brought the right-of-way question to a head, so that in 1843 a proposition was introduced into the chamber of deputies, for a law declaring that *all* irrigation works constructed by companies *or individuals* should be declared to be of public use, according to the forms of the law of 1841. And this, in turn, caused the introduction of another proposition for a law of dispossession for right-of-way in favor of *all proprietors*, whether owners of bank lands or not, who wanted to use water for the irrigation of their estates.

It was pointed out at the time that one of these propositions was opposed to the principle of the fundamental law of the country—that private property could only be condemned for public and not for private use; and that the other proposition was opposed to the well established exclusive right of riparian owners to waters of non-navigable and non-raftable streams. The whole question of a draft of a law as a substitute for these was then referred to a commission, and this commission reported, and the chambers, after a long consideration, passed the law, which here follows:

Law upon the Right of Way for a Canal—Passed twenty-ninth of April, 1845.

"Article 1. Every proprietor who may wish to be served for the irrigation of his property with the natural or artificial[2] waters of which he has the right to dispose, can obtain the passage for these waters over intermediate lands by previously paying a just indemnity. There are excepted from this servitude houses, pleasure grounds, gardens, parks, and inclosures belonging to dwellings.

"Article 2. The proprietors of lower lands will have to receive the waters which percolate from lands thus irrigated; being indemnified, however, if damaged. Houses, pleasure grounds, gardens, parks, and inclosures belonging to dwellings will be equally excepted from this servitude.

[1] See, particularly, Dumont, Book II, Chap. V, and *Les Annales des Ponts et Chaussées*, Laws and Decrees, 1845 and 1847; also, De Passy.

[2] "Artificial" waters: those drawn from deep wells or otherwise brought to the surface of the ground artificially.

"Article 3. The same right of passage over intervening lands will have to be accorded to the proprietor of a property submerged in whole or in part, for the purposes of drainage.

"Article 4. The questions to which the establishment of this service will give rise, the fixing of alignment of the water conduit, of its dimensions, and of its form, and the indemnities due—it may be to the proprietor of the land traversed, it may be to that of the property which will receive the drainage waters—will have to be taken before the courts, which in pronouncing on them will have to conciliate the interest of the enterprise with the respect due to property. It will be tried before the tribunal in a summary manner, and if a question for experting, it will only be necessary to name one single expert.

"Article 5. There will be nothing detracted by the present provisions from the laws which regulate the police of waters."

The consideration of this law on its passage gave rise to long and stormy debates in the chambers of the legislature, in which it was attacked on about the same grounds as those previously referred to the commission. A synopsis, with extracts at length from the speeches of these debaters, is given by M.M. Dumont, and as the result of their consideration of the subject the following conclusions are drawn:

First—That the law had for its sole object the establishment of a legal servitude to be laid on property in obtaining a right of way to conduct across it such waters as one has the right to dispose of.

Second—That it leaves intact all the points of the laws and decisions preceding it and relative to the ownership, right to use, and police of waters.

These conclusions have since been repeatedly verified by decisions of the courts of highest resort. The nature of this servitude and the spirit in which it was advocated may be well understood from the following: In the course of the debate the judge advocate said, "the judicial power can, according to the case, grant or refuse the servitude, as it is or is not justified by real irrigation interest;" and commenting on this and other paragraphs M.M. Dumont say:

"It is without doubt that the courts are not obliged to grant the servitude of passage every time it is demanded; on the contrary the law imposes on them the duty to estimate the degree of usefulness it has, to balance this usefulness with the injury that the digging of the canal might cause to properties, to examine if the water proposed to be diverted has not already an equally

beneficial application, and, finally, to consider all the circumstances of the case."

"The servitude is created for the benefit of lands *for irrigation*, and not for conducting water for ornamental or any other purpose, and the courts will refuse to allow its application for any other purposes than those of the irrigator."

Servitude of Right-to-Abut-a-Dam.[1]

The passage of this right-of-way law went far to set aside the difficulties attending the establishment of private irrigation works by riparian proprietors on the non-navigable streams, and those who had obtained water concessions on public streams, from the administration, and those who owned the waters of springs. But a great difficulty yet remaining was that of acquiring the right to construct a dam against the bank of another riparian proprietor. One might own one bank of a stream yet could not build a dam in it to divert water on to his own land, should the owner of the opposite bank object to the end of the dam being rested against his land. Or one might have right of way to conduct water, but not right to put a dam in a stream to divert it, because the bank owners objected, and this, too, when the administration may have approved the project. This condition of affairs led to great conflicts, and these resulted in the passage of the following law:

Law Upon the Right-to-Abut-a-Dam—July 11, 1847.[2]

"Article 1. Every proprietor who will wish to be served for the irrigation of his property with the natural or artificial waters of which he has the right to dispose, will be able to obtain the privilege of supporting upon the property of the opposite bank-owner the works necessary for its taking, upon previously paying a just indemnity. There are excepted from this servitude the buildings, pleasure grounds, and gardens belonging to dwellings.

"Article 2. The riparian owner of the lands upon which the right will have been claimed can always demand the common usage of the dam by contributing one half of the expenses of the establishment and maintenance of it. Any indemnity will not be due in this case, and if any has been paid it must be returned. When this common usage will only be claimed after the commencement, or the completion of the works, the payment which the second proprietor will have to make in order to have the right to use it, will be only that amount which it is necessary to expend in order to make it available for taking out water on his bank.

[1] See, De Passy, and Dumont.

[2] *Les Annales des Ponts et Chaussées*, Vol. Laws and Decrees, 1847.

"Article 3. The questions to which the application of the two above articles will give rise will be taken before the courts. They will be proceeded with in a summary manner, and if there is need of experts, the tribunals will name only a single expert.

"Article 4. There will be nothing detracted by the present provisions from the laws which regulate the police of waters."

Application of these Laws.[1]

The law of 1845 concerning the servitude of right-of-way to conduct water, and the law of 1847 concerning the servitude of right-to-abut-a-dam, were intended for application only in cases of individual or private works, and unless their application is specially extended by law they cannot be availed of by companies or associations of land owners. Two individuals cannot jointly invoke the application of either of these laws, though each for himself can. Associations of landholders cannot avail themselves of these laws unless they organize according to the terms of a law of 1865, regulating the formation of syndicate associations, which expressly extends to such associations when duly recognized by the administration, the benefits of the laws in question. Hence "free" syndicate associations cannot force a right of way or a dam right, but "authorized" associations can.

The decrees of authorization of syndicate associations and the laws or decrees sanctioning the formation of canal companies, and granting them concessions of water privileges, always contain a clause extending to them the right, not only of eminent domain under the laws of 1833 and of 1841, to condemn lands for right-of-way, but also the rights of laying the servitudes of right-of-way and right-to-abut-a-dam under the laws of 1845 and 1847, and it is usual to stipulate that lands for all main works shall be expropriated and paid for by them, and that only the servitude of right-of-way shall be acquired for minor works.

The right-of-way law cannot be applied to force an upper ditch owner to enlarge or deepen his existing canal in such manner as to pass sufficient water for other irrigations below; but it may be used to force any number of ditches through one piece of property, if the courts choose to allow its application for the purpose.

[1] See, De Passy, pp. 50, 89, 90, 100, 287, 314, and elsewhere.

AUTHORITIES FOR CHAPTER VI.

Dumont.—[Work cited as an authority for Chapter II.] See Book II, Chapter V.

De Passy.—[Work cited as an authority for Chapter II.] See pp. 50, 89–100, 287, 314, and elsewhere.

Les Annales des Ponts et Chaussées.—[Work cited as an authority for Chapter II.] See Vol. XII, p. 328, *et seq.*, Vol. XX, pp. 203–217; also, Vols. Laws and Decrees for 1845 and 1847.

CHAPTER VII.—FRANCE[6];

IRRIGATION ENTERPRISE AND ORGANIZATION.

SECTION I.—*Governing Influences.*
Diversity of Climates.
Sentiment Concerning Irrigation.
Small Land-Holdings.
The Agriculturists not Capitalists.
Jealousy of Property Rights.
Timidity in Regard to Indebtedness.
Heavy Cost of Works.
Poverty of Peasant Proprietors.
High Valuation of Lands.
Riparian Rights and Other Complications.

SECTION II.—*Irrigation Organizations.*
Speculative Companies.
Associations of Landholders.
Free Syndicate Associations.
Authorized Syndicate Associations.
Powers of Prefects and Principles of Association.

SECTION I.

GOVERNING INFLUENCES.

Climatic and Social.[1]

France lies in the zone intermediate between those latitudes, in Europe, where, on the one hand, irrigation is, as a general thing, an absolute necessity to success in agriculture, and where, on the other hand, it is useful only as an auxiliary to special cultivations, in limited localities and for particular purposes. The climate of France, as affecting irrigation, is almost as varied as that of California; so that there are regions where the annual rainfall scarcely exceeds a foot in depth, and where it is so distributed, as to time, that there must be artificial waterings of all crops, to supply the

[1] See, Reclus, chapters "France;" also, Mangon, and De Buffon, Book I, Sec. 1.

deficiency of moisture to the soil and plant, and irrigation is practiced during the spring and summer months for this purpose.

And, again, there are regions, by comparison, quite cold, with twice to three times as much rainfall as in those first spoken of, and distributed well throughout the year, but where irrigation is practiced far more copiously, and every month in the year, not to supply any deficiency in moisture to the soil and plant, but to serve as a fertilizer and as an equalizer of temperature to the grass meadows upon which extended dairy farm interests depend.

As a general thing, however, France is less an irrigation country from necessity and for general profit, than is California, for the valleys of France, with exceptions limited to small regions, receive from sixteen to thirty-two inches of rain each year, while ours of California receive only ten to eighteen inches, as a general rule. The necessity for and value of irrigation in France was not sufficiently appreciated by the generations past, to bring about a general sentiment in favor of national encouragement to irrigation enterprise. Irrigation has been there, as in California, until within comparatively few years, looked upon more as a local necessity, for some parts of the country, than as a valuable auxiliary to general agriculture, and as a process essential to higher and fuller agricultural development for all parts of the country. Hence, there has not been that widespread appreciation of the subject among the people of all France which we, not realizing these points, might expect to find recorded.

Small Land-Holdings and Jealousy of Rights.[1]

The lands are very generally held in small tracts; and close and thorough tillage has taken the place of that wasteful, but easy use of water, which is substituted for skill and industry in some other countries which might be mentioned.[2] The generally humble condition of the peasant land proprietors, of south France particularly, and the minute subdivision of land, may be judged from the fact that when the association for the canal de l'Isle, department of Vaucluse, was set on foot in 1845, there were 1,414 subscribers, of whom 1,095 desired irrigation for tracts less than one hectare (2.47 acres) each, and 205 others for tracts less than

[1] See, Moncrieff, pp. 38, 39, 61–63, 76, 77, Chap. II; also, Barral.

[2] It is not to be understood from this, however, that the use of water in France is particularly economical. As will be shown in a later part of this report, such is not the case.

two hectares, and, out of the whole number, only four subscribed for areas greater than ten hectares (24.7 acres) each.

The St. Julian canal, eighteen miles in length, irrigating from 6,000 to 7,000 acres of land, is the property of an association of irrigators, having 2,060 members; and the Crillon canal, irrigating 1,600 to 2,000 acres, has 750 subscribers to its construction and maintenance; these cases showing from three to three and a half acres in one instance and from two to two and a half acres in the other as an average to the subscribing proprietor or irrigator. "This minute subdivision of land seems to be at once the promoter and the hindrance to the extension of irrigation in France. It is these peasant proprietors alone, who till their own fields with their own hands, who fully appreciate irrigation." Without it their lands require less labor than can be put on them to advantage with it; and their spare time must be spent in labor for hire which is uncertain and not very remunerative. With irrigation their time may be fully occupied on their own lands and their labors be rewarded by sure and abundant harvests.

The large land proprietor, on the other hand, who lets his land out to tenants, reaps less direct benefit from irrigation, for the tenants, alleging that much labor is bestowed on works that remain with the estate, refuse to pay materially higher rents by reason of irrigation facilities. Hence, the larger landholders cultivate their fields in cereals and other crops not requiring irrigation, and taking less constant and skilled attendance and labor than do those irrigated; and, hence, as a general thing, in this south of France, where irrigation is most necessary, were it not for the desire of the smaller proprietors for irrigation on their tracts, many existing canals would not have been built when they were, or perhaps not at all. The greater appreciation of and desire for irrigation, by small proprietors than by large, is attested by the figures heretofore given for the case of the canal de l'Isle, and by the fact that in this case the small proprietors generally subscribed for water for the whole or at least half the areas of their lands, while the few large proprietors who interested themselves at all in the undertaking, subscribed for very small portions of their estates.

Heavy Cost of Works—Poverty of Peasants.[1]

And now, where irrigation has not yet been introduced, these peasant proprietors are poor and have no credit, individually; so that the want of capital among them, and the apathy of the larger proprietors, forms the greatest drawback to the further extension of irrigation. In this condition of affairs a great trouble met with in the promotion of irrigation enterprise is the difficulty of securing subscriptions for water for a reasonably large proportion of any compact district, so that the lands subscribed for, being in small parcels and scattered, the works are made very much more costly to the unit of area irrigated than they otherwise would be, and the cost of maintenance and administration is greatly increased. In the case of the canal de l'Isle, already spoken of, the total cost of construction for all works was estimated at about $23 per acre for lands subscribed for, as against $6 50 per acre if all the irrigable lands in the district had been subscribed for and the works made adequate to supply water for them.

High Valuations of Lands.[2]

Another great drawback to the advancement of irrigation is the high price that land commands without water, and the high price of rights of way. In the region spoken of, dry valley lands range in price from $300 to $800 per acre, while if commanded by a canal for irrigation, and having a subscription for water, they are worth only about thirty to fifty per cent more, according to circumstances.

Now, in California lands purchasable at $3 to $10 without opportunity or reasonable hope of irrigation, command $50 to $200 per acre when water is brought to them and they have the privilege at hand to receive and pay for irrigation. There has been no such opportunity to speculate in lands in France, in connection with irrigation enterprise, as there has been in California, and, thus, a great incentive to the construction of works has not been present there that has been afforded here.

The Riparian Rights Question.

The riparian rights question which has come up, as we have seen, in a peculiar form in France, and the right-of-way question,

[1] See, Moncrieff, Chap. II.
[2] See, Moncrieff, Chap. II; also, Barral.

also distinctive in its character, have held back irrigation enterprise immeasurably, but the conservative business temper and poverty of a large element of the agricultural population, and the indifference of the landed capitalists to the development of an industry which was calculated to render the care of estates more burdensome, has done much more to prevent advancement in this line of enterprise.

Meanwhile, it has been the object and apparently the earnest desire of the government, not only to provide by legislation some means of directly meeting and setting aside the circumstances and retarding influences spoken of, but to impart an active impulse to agricultural development by enterprise in irrigation. It now remains to be seen what means have been employed with this view.

SECTION II.

Irrigation Companies and Associations.

Speculative Companies.[1]

Although not an invariable rule, the form of irrigation enterprise in France, and of government encouragement thereto, has been largely governed by the character of the stream—whether floatable or non-floatable—from which it was necessary to derive the supply of water in each case.

From floatable streams—dependencies on the public domain—the government, exercising the full right of state ownership, could authorize diversions by and encourage the construction of works on the part of any worthy applicant for concessions. And, hence, capitalized companies of non-landholders have sought and obtained sanctions and privileges for the construction of works from such streams. The character of these organizations and their method of operation in the enterprises undertaken, will be of necessity sufficiently illustrated in the next section of this chapter, in speaking of the policy pursued by the government towards them, and, hence, nothing further will be said of them here.

[1] See, De Passy, pp. 103–130; also, Dumont.

Associations of Land Owners.[1]

On streams not of the public domain another form of organization for works has been necessary. Remembering that water rights for purposes of speculative canal enterprise, are not to be acquired on streams not declared navigable or floatable, that the waters are held for the bank lands, and that land holdings are, as a very general rule, in small parcels, we see that individual enterprise in canal building from such streams, is kept within very narrow limits.

The waters are dedicated to the use of the riparian proprietors for the irrigation of their river lands—the water, in a measure, is attached to the lands, to the extent of their necessities, and cannot be alienated. A proprietor, by buying back land adjacent to his bank land, can to some extent increase the width of his irrigable area, but the courts and the administration—the one restricting the extent of his water privilege, and the other the size of his headworks—would very soon stop any attempt at an extension in this way which was not equitable to other proprietors. Furthermore, rivers of this class in France generally run in valleys whose lands slope down towards the streams (and not, as do many streams in California, across plains which slope back each way from the stream), and, consequently, canals of short length cannot command any considerable width of territory for irrigation.

These circumstances have resulted in the construction of a great number of very small ditches, where, as is frequently the case, the grade of the streams has been sufficiently rapid to admit of the water being brought out upon the land within the limits of one, or at most, several land holdings. The scope of these individual and partnership enterprises has been, until within a few years in the past, still further restricted by the absence of any legal means of acquiring right of way for a canal through, or right to build a dam on or next to the lands of others. The leading writers on irrigation dwell upon the great drawback to irrigation in France, which has resulted from these circumstances.

Furthermore, the simple partnership association which would answer as a business arrangement between several neighbors, for

[1] See, Dumont, Book II, Chap. VI, Sec. 1; De Buffon, Vol. 2, pp. 89-98; De Passy, pp. 79-102.

the construction of a little private ditch, would not answer for the organization of a large enterprise for the benefit of perhaps several hundred or thousand land holdings. The French agriculturists appear to have been extremely jealous and careful of their rights; desiring to have and hold them, as near as possible, immediately under their personal control, and hence have not adopted forms of association which would be popular in this country.

These circumstances led to the passage of laws recognizing the form of organization known as a *syndicate association*, which is that now generally adopted by landholders for the conduct of works on joint account, necessary in the development, in any way, of agricultural neighborhoods. A syndicate association is a society of land owners, organized according to general forms prescribed by laws and decrees, but with terms of organization arranged according to the will of the members, as embodied in the articles of association.

An Analysis of the Law of Association.[1]

The law recognizes eight purposes for which syndicate societies may be formed, as follows:

First—The construction and management of embankments and other works for protection against the sea, torrents, and the waters of non-navigable rivers.

Second—The cleansing, deepening, straightening, or regulating canals and water-courses not navigable nor floatable, and of irrigation and drainage canals.

Third—The construction and management of works for the drainage of fresh water marshes.

Fourth—The construction and management of works for the reclamation of salt marsh lands.

Fifth—The construction and maintenance of works for the sanitary improvement of wet and unhealthful districts.

Sixth—The construction and management of works for irrigation and *colmatage*.

Seventh—The construction and maintenance of works of land drainage.

Eighth—The construction, maintenance, and management of roads and every other improvement of agricultural lands and neighborhoods, which requires coöperation amongst proprietors.

[1] See, particularly, De Buffon and De Passy, as cited; also, law of June 1, 1865, Decree of November 17, 1865, and the Ministerial Regulation—Appendices 2, 3, and 4, De Passy.

The general organization of associations is the same for all of the purposes specified, but the details of agreement and administration differ with the object in view. The forms and provisions ordinarily followed and adopted in and by associations for irrigation, only, will be spoken of here. The law recognizes two kinds of syndicate associations: The first called "free," because held together only by the expressed will of the members; and the second called "authorized," because specially declared, in each case, to constitute an organization of public utility, and so "authorized" to exercise the right of eminent domain in condemning private property for the purposes of the association.

These societies are formed upon the basis of the land to be beneficially affected by the works contemplated; representation and voting power in the general assembly of subscribers being proportioned somewhat to the area held, varying in different cases, within prescribed bounds, according to circumstances and as determined and settled in the constitution or articles of agreement of the society. Their boards of directors called *syndics* constitute the *syndicate* proper, although the whole association is frequently called a syndicate. Being legally constituted bodies, they can enter into court, acquire or dispose of, exchange or hypothecate property, and do all that an individual might do in a business way.

Free Syndicate Associations.

Free syndicate associations are formed by the declaration of the associates, and the signing of the agreement of association, etc., as follows: The agreement or act of association specifies the object of the enterprise, regulates the mode of administration of the society, and fixes the limit of authority confided to the administrators or syndics. It determines the ways and means necessary for the raising of funds, and the mode of collecting assessments or subscriptions. It must be published in a journal of official announcements, and copied into the records of the prefecture.

In the case of an association formed for the construction, maintenance, and management of irrigation works, all proprietors of lands susceptible of irrigation, within the district, must be admitted as members should they desire to join; each designating the lands and the area thereof for which he desires to subscribe. The volume of water conceded is ordinarily divided amongst the proprietors in proportion to the area subscribed for, and without refer-

ence to the kind of crop or character of land cultivated and worked. These terms being fixed by the articles of association in each case, and not by the law, are variable, according to the will of the associates. The right of irrigation goes with the land subscribed for, and cannot be alienated or passed to other lands.

Each associate is bound to accord right of way for ditches through his land, upon payment of indemnity fixed by arbitration. Each associate is a member of the general assembly, having voting power according to the terms of the agreement in each case. Sometimes the vote is by units of land area between certain limits, a minimum area and a maximum area to a vote, or, for instance, one vote to each holder of from one to five hectares. Thus the proprietor owning between one and five hectares (2.47 to 12.35 acres), would have one vote each; those between five and ten hectares, two votes each, and so on, a vote to each five hectares or fraction not less than one hectare.

The general assembly elects directors, called *syndics*—five, seven, nine, or more, as the case may be—who form the *syndicate*, or board of management of the association. In some organizations the syndicate is all powerful—in others, many questions have to be submitted to the general assembly for final settlement. The syndicate name from their number a manager or general director, who is the chief executive officer of the association. Other officers, as secretary, treasurer, etc., are similarly named, as in societies whose organization is familiar to everybody.

The syndicate employs an engineer, and all projects for work are duly and completely drawn up and adopted by the board before construction is authorized. The cost of works and expenses of management are ordinarily borne in proportion to area subscribed for, and without reference to value of lands or crops, or character of cultivation or soil. Assessments under the law are made collectible as taxes, and are a lien on the property subscribed for.

Authorized Syndicate Associations.

All syndicate associations must be first formed as free associations, and they may then apply to the administration for recognition as authorized associations. The prefects of the provinces have authority to make these decrees of recognition and authorization, following after certain forms and instructions embodied in decrees and laws of the general government.

The application to the prefect must be accompanied by plats of the proposed district, including the lands to be irrigated, each parcel being designated and tinted with a color representing its condition as to cultivation, soil, etc., and whether or not it is irrigable, and if so whether or not it is subscribed for in the association. A list of subscribers accompanies these plats, and a statement of the financial ability of the subscribers to meet their engagements. A regular project for works and for financial management is also submitted, from which to judge of the feasibility and cost of the scheme and the adequacy of the organization to carry them out.

The law provides that the desire of the members of the free association, to have it converted into an authorized association, must be expressed in general assembly, as follows: "If the majority of the individuals interested, and representing two thirds of the area of land subscribed for, or if two thirds of the individuals owning more than one half of the area of land subscribed for," desire the change, the prefect, being satisfied of the soundness of the enterprise in other respects, issues the decree of authorization. The application must show, in addition to all the above, the plan of the organization, the plan of representation in the general assembly and the basis for voting, as well as the basis for the division of expenses.

Following this application a public announcement is made. The application is published, and the plans, etc., are opened to inspection and comment and everything opened to objection. Each proprietor of lands affected is notified as to the application, and requested to appear at the prefectorate if he has any objections or criticisms to make. A register is exposed, in which every interested party may write his remarks and criticisms. A commission of landholders not interested is appointed to report on the results of the examination.

These and other formalities, taking a month or more according to circumstances, being gone through with, the prefect considers the case and renders his decree of authorization or refusal. The action of the prefect one way or the other may be appealed from, to the minister of public works.

Prefectorial Power—Governmental Policy.

Prefects may refuse to issue decrees of authorization for associations, for various causes, amongst which are the following: The

district not being large enough to render its works of public utility; the proposed works themselves not being sufficiently important to justify the foundation of an authorized association; the district not comprehending the area it should take in, and other proprietors desiring to come in; the lands within the district not being sufficiently subscribed for.

In the case of authorized associations the government in a measure becomes accountable for the meeting of their engagements, so that the assessments are not only collectible as taxes by the officers of the syndicate, but the government authorities, if necessary, may interfere and force their collection so as to make good the debts of the district.

Condemnation of lands for the benefit and use of the association is conducted by the syndicate in conformity to a general law providing for the condemnation of private interests for the public good, but this can be done only after a declaration of public utility has been made in favor of the proposed works in each case by the council of state, or by a special law.

In cases where the association asks a subsidy from the government funds, or from those of the department, it is always provided that the prefect may name a number of syndics to represent the state or the department in the syndicate, in proportion to the part of the whole cost of the works which the subsidy provides for.

In cases where the association is formed for irrigation, or any purpose where water is desired as an auxiliary to some operation to be carried forward, the formation of the society may be had for only a portion of the district embraced within the exterior limits of lands subscribed for; but in cases where, as in reclamation or drainage, all of the lands in the district are necessarily affected by the works, the whole area is brought under contribution, and when two thirds of the land is subscribed for, the other third is forced to contribute its share to the expense.

This rule is the outcome of a long struggle in France, in which it has been proven, that some landholders will always hold back and prevent necessary public improvements, and that the interests of the public demand, in cases of reclamation and drainage, that they be made to join in with the majority in their district, or sell out to those who will carry forward the works. And the tendency of events and sentiment is towards a similar policy with respect to irrigation district enterprise, also.

AUTHORITIES FOR CHAPTER VII.

Reclus.—[Work cited as authority for Chapter II.] See chapters, "France."

De Passy.—[Work cited as an authority for Chapter II.] See, particularly, pp. 79–102, 103–130, and Appendices 2, 3, and 4.

Dumont.—[Work cited as an authority for Chapter II.] See, particularly, Book II, Chap. VI, Sec. I.

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CHAPTER VIII.—FRANCE[q];

GOVERNMENTAL POLICY AND IRRIGATION CONCESSIONS.

SECTION I.—*Features of Policy and Forms of Enterprise.*
Political and Social Conditions.
Forms of Governmental Encouragement of Irrigation.
Early Irrigation Enterprise.
Tax Rebate on Advanced Values.
Subsidies, Advances, Loans, and Guarantees.
Prize Competition in Irrigation Practice.
Statistical Atlas of Irrigation.

SECTION II.—*Notable Instances of Enterprise and Encouragement.*
The Canals—Des Alpines, Carpentras,
Cadenet, St. Marterey, Siagne.
Siagnole, Bourne, Rhone,
Vesubie, Pierre-latte, Manosque,
Herault, Ventavon, Petite-Vence,
Malpas, St. Marcel, Argeliers, and Raouel.

SECTION I.

FEATURES OF POLICY AND FORMS OF ENTERPRISE.

Political and Social Conditions.

The French government, although apparently always appreciating the value of irrigation to all France, and directly favoring irrigation enterprise, as we shall see, by several important measures of policy, has not, as in the case of interior navigation and the promotion of arterial drainage and consequent land drainage or reclamation of lands, directly taken the lead in the construction of works for the purpose, at public expense and wholly under national management, except in cases where the submersion of vines to exterminate the phylloxera vine pest was a pressing consideration, or in large districts where the landholders were exceptionally poor and without credit.

Rivers were improved and made navigable where before unfitted

for the purpose, and great canals constructed for navigation, as public works of the nation, more than a century ago. The policy which prompted this action has ever been in the ascendency, and was quite fully developed under the last empire, and has been renewed and enlarged upon by the present republic; but towards irrigation, the policy has been rather to encourage the efforts of landed proprietors in constructing their own works, or to encourage the investment of capital in irrigation enterprises upon terms such that, at the expiration of long periods of years, the works should revert to associations of the owners of the lands irrigated, or to the central, departmental, or municipal governments, for the benefit of the people.

It is to be remembered that all of the irrigable lands were in private ownership—the government not having any irrigable public domain—and that in the view of men of broad ideas, such as the rulers of the country have probably been, all France was an irrigation country, and should the government undertake the construction of works for the irrigation of one section, without some specially potent reason, it should for equally good reasons bring water to the irrigable lands of all the people.

Furthermore, the French agriculturists—although largely composed of a peasantry inferior to American farmers in enterprise, wedded to old habits and customs, and comparatively slow to take up with and realize the lessons of experiences had elsewhere—have never stood in that dependent relation to their government, which those of Egypt and of India, where nearly all irrigation works are built and managed by the governments, have to theirs. The French government realized this difference in the people and the political and social conditions of countries, when in its province of Algeria it pursued a different course towards irrigation, and, following in the footsteps of the khedives of Egypt and the English rulers of India, constructed great irrigation reservoirs, canals, and ditches, as public works of the nation.

Forms of Governmental Encouragement.[1]

As we have seen, irrigation enterprise in France has taken three forms:

[1] See, De Passy, Dumont, and Malapert; but, particularly, the various laws making concessions to companies, societies, and associations as hereafter quoted, and many others to be found in the volumes of *Les Annales des Ponts et Chaussées.*

First—In the construction of works on private account for the benefit of private lands, by one or several land proprietors jointly.

Second—In the construction of works for the common good of the owners, by associations of land proprietors.

Third—In the construction of works by individuals, companies, or municipalities, for the distribution and sale of water to consumers.

The government has encouraged all these forms of enterprise, and has also encouraged the skillful and economical use of water in irrigation by the individual irrigator. This policy of direct encouragement has in application taken various forms, as follows:

First—A remission of tax assessments, for certain long series of years, on the increase of land valuations due to irrigation.

Second—The loaning of funds on favorable terms to companies or associations undertaking irrigation works.

Third—Advancing to such companies or associations a large part of the cost of their works, and taking the works themselves in payment at the expiration of long term concessions.

Fourth—Subsidizing enterprise in the construction and management of irrigation works, by payment of large sums to the sole benefit of the companies or associations, or that of the departments, municipalities, or irrigators ultimately acquiring ownership of the properties.

Fifth—Guaranteeing interest on capital invested in or borrowed on great irrigation works.

Sixth—Construction of main irrigation works at state expense and turning them over to syndicate associations for management.

Seventh—Construction and management of irrigation works wholly as public works of the state.

Eighth—The inviting of competition in and granting premiums for the best irrigation practice.

Ninth—The collection of irrigation statistics and useful data of irrigation practice, and the publication thereof for general information.

Early Irrigation Enterprise.[1]

The first works of irrigation, other than purely individual enterprise, constructed in France, were made under grants of right from the counts, and were combined with and secondary to those for water-power purposes. Thus, in 1171 Raymond V, Count of

[1] See, M. Conte in *Les Annales des Ponts et Chaussées;* also, Barral.

Toulouse, in the south of France, granted to the bishop of Cavaillon the exclusive right to divert water from the Durance, a river carrying 3,000 cubic feet per second at its low stage, into canals for the purpose of supplying power for cornmills to be erected. The bishop constructed a work known as the St. Julian canal, and sixty-four years afterwards granted to the inhabitants of Cavaillon the right, for which they had applied, to use the waters in irrigation. This led to an enlargement and extension of the canal and an agreement as to the distribution of expense for maintenance of the work, and to this day, in accordance with this ancient usage, those who use water for power pay one third the annual expense, while those who use it in irrigation pay the other two thirds. This was one of the first, if not the first enterprise of which there is record, in which a trace of encouragement to irrigation on a large scale is to be detected.

Permits for water for irrigation from canals constructed by government for purposes of navigation, were granted in the early period of public works enterprise, but these were for very small quantities of water and to individual farmers or small communities only. At a later period in the construction of some government canals for navigation, irrigation, as well as the supply of water for motive power, for industrial uses, and municipal domestic purposes, was considered, and the works planned so as to produce a current from the main source of supply, such that while navigation was not impeded the other interests were to some extent subserved. But these instances have been exceptional in the planning of public works, and it cannot be said that irrigation has received generally any material help in this manner until within the past few years, when quite a number of small canals have been built out from the main canals of navigation, in part for purposes of irrigation, but chiefly with the immediate view of preventing the spread of or destroying the phylloxera by flooding the vineyards.

Tax Rebate on Advanced Land Values.

The first form that direct encouragement to irrigation enterprise on a large scale took in France, was that of an engagement, on the part of the government, not to raise the assessed valuation of the lands brought under irrigation above what it had been before irrigation, for a period varying from twenty to thirty-five years after the waters were introduced on them, and not to tax the works of irrigation at all for some such like period, but only to assess the

lands occupied by them, as they had been assessed before. In the case of the Carpentras canal, in south France, constructed in 1853–54, this period was fixed at twenty-five years after the construction was completed, according to plans, specifications, and agreement.

This was a species of encouragement more especially in the interest of land proprietors, who would unite in an association, under terms of law, over a sufficiently large area to promise a development calculated to be of future importance to the country, and who, under governmental supervision, undertook to construct substantial works to insure such development by the irrigation of their lands. Even with this encouragement, irrigation made slow progress in France. Great areas of country stood much in need of it; other considerable regions were in a condition to be greatly benefited by it, but the spirit of enterprise did not seem to take hold of the landholders, in the cause.

The rich did not want to adopt a system of agriculture calculated to make advisable the expenditure of much more labor on their farms, and to require a much closer attention to their estates; and they did not generally appreciate the moneyed value of irrigation properly conducted.

The poor landholders in many quarters were not awakened to the results of experiences in irrigation favorable to their class in other quarters, were wedded to old habits and customs, were jealous of the slightest move calculated in any way to interfere with their full control of their little home grounds. They did not understand and could not appreciate the benefits of association of interests for common good in districts. They each would like to have a canal or ditch of their own, but did not want to join with several hundred or thousand others to get one jointly. Further than this, their poverty often, though their conservatism were overcome, stood in the way of their undertaking large works, even when they might combine for the purpose; and, as we have seen, the laws themselves hampered the spirit of enterprise on non-navigable streams, by the water-right complications which the riparian right and other rules had brought about.

Subsidies, Advances, Loans, and Guarantees of Interest or Income.

Government encouragement then took the forms of loaning funds for long terms on irrigation works, advancing part of the

cost of the works, and taking the works themselves in payment at the end of long terms, and subsidizing large irrigation enterprises, without return other than nominal. These forms of encouragement were more directly intended to give irrigation projects good financial standing, and to enable capital to enter into the field of enterprise with a certainty of a moderately good return.

Being incident to the construction and management of works, and not to the ownership or tillage of lands, these measures addressed themselves to capitalized companies or societies; and a number of such organizations have sought and taken up with government offers of this kind, binding themselves to construct works according to prefixed and approved plans, to maintain and manage them under prearranged regulations and governmental supervision, to deliver water for irrigation, etc., at predetermined rates, and, finally, to return the money borrowed, or turn over the works to the government or a department, or, perhaps, to a syndicate of landholders, at the expiration of the term of the concession. Direct subsidies, without return, have only been granted to syndicates of landholders, and presumably in cases wherein their financial condition was poor and their credit bad, and not to capitalized companies, as in the cases of the encouragements by loans or advances on cost of works. These measures of encouragement brought about also the organization as capitalized companies, of a number of associations of irrigators, who have sought to derive not only the advantages of the first measure, in the limitation of taxing valuations, but also the benefits of loans, advances, and subsidies.

Prize Competition in Irrigation Practice.[1]

The final measure of financial encouragement to irrigation which the French government has instituted of late years, is that of giving premiums for the best examples of irrigation practice in the several great irrigation centers, the convoking of meetings of irrigators and land owners on the occasion of making the examinations of competing tracts, and the publication in great detail of all valuable and practical facts about irrigation acquired by these examinations, meetings, and discussions for general information. From the first report of Mr. Barral, the reporter of the commission or jury appointed to conduct the first of these proceedings in the department of the Mouths of the Rhone in 1875, I take the following

[1] See, Barral, particularly, Chapters I and II of each volume.

general account of the origin, purpose, and progress of the movement:

"The minister of agriculture, vividly impressed with the role that irrigation plays in the practice of agriculture in the south of France, and the necessity for showing to the agricultural population all that can be derived from irrigations properly conducted, in the interest of individuals or the wealth of the country, resolved to institute for five years in the department of the Mouths of the Rhone, a convention of agriculturists, whether proprietors or renters, who have used waters from the different irrigation canals in an intelligent manner."—[Barral, Vol. 1, Chap. I.

Prizes and medals were promised by a decree of June 2, 1874, to those whose use of irrigation waters could be shown to have been the most systematic, economical, effective, and remunerative. This decree of the minister of agriculture, representing the government, was as follows:

"The minister of agriculture and commerce, with the object of encouraging the efforts that tend to the progress of agriculture, and especially to cultivation by irrigation, looking at the losses occasioned by phylloxera, and the necessity to transform or increase the production of irrigable land; looking at the notice of the inspector-general of that region (the Mouths of the Rhone); on the proposition of the director of agriculture, issues this:

"DECREE:

"Article 1st. Rewards are offered in the department of the Bouches du Rhone, in 1875–6, '77, '78, and '79, to agriculturists, proprietors, or renters, who have utilized in the most intelligent manner the water of the different irrigation canals.

"Article 2d. These rewards are divided in the following manner:

"FIRST CLASS—Properties containing more than four hectares (about 10 acres) of irrigated land—

"1st prize—Gold medal, and 1,000 frcs. ($250).

"2d prize—Silver medal, large size, and 700 frcs. ($140).

"3d prize—Silver medal, and 600 frcs. ($125).

"SECOND CLASS—Properties irrigated to an extent of four hectares and less—

"1st prize—Gold medal, and 600 frcs. ($125).

"2d prize—Silver medal, and 500 frcs. ($100).

"3d prize—Bronze medal, and 300 frcs. ($60).

"Article 3d. A work of art would be bestowed on the winner of the first prize of one of the above classes, if recognized or judged worthy of being specially rendered noticeable for the economical management of water in the practice of irrigation.

In case of the gift of the work of art, the gold medal, for first prize, will not be bestowed.

"Article 4th. The statement of the contestants, containing an explicit note and an exact indication of the extent irrigated, certified by the mayor of the commune, must be addressed to the prefecture of the Bouches du Rhone, on March 1st, current year, at the latest.

"Article 5th. The director of agriculture is charged with the execution of the present decree.

"Made at Versailles, June 2d, 1874.

"L. GRIVART, Minister, etc."

In 1875, besides the very general interest awakened amongst all agriculturists in the region, there were thirty-nine competitors for the rewards or prizes, and each property and system was made the subject of special study by the commissioner or jury.

M. Barral says: "This study presented great interest. The question was not only that of the competition for the prizes, but was also that, which is of a higher order, of ascertaining the services rendered by the water in giving a more abundant production, and in the protection of vines against the attacks of the phylloxera. The examples of irrigation practice reported are of the highest importance to agriculture, and of great use to those who are in a position to usefully employ water in cultivation.

"The circumstances under which these cultivations were found, in response to the offer of the government, are varied enough to justify the drawing of general conclusions from the facts observed. These conclusions show that a great increase of wealth would be the result for national agriculture, were works undertaken on all water-courses capable of being transformed into irrigation canals or capable of feeding such canals. In view of these things the judge-advocate of the jury received orders to enter into all the details of the subject. His statement must contain all information needed in the practice of irrigation, and, also, all that might be of service to the officers of the public administrations.

"With the view of making a network of canals all through the country, it is important to encourage the forming of companies or associations having power to construct works, and to develop amongst the rural population the habit and skill of using water in irrigation systematically; to incite land owners to engage in irrigation enterprise and advance the funds necessary for the diversion of large streams with the certainty of receiving considerable profit from it.

"The object of this report, therefore, is not only to point out by the proof of facts that can easily be verified, the justice of the decisions in the competition of the year, but to make known to all agriculturists, and to land owners, what an enormous source of wealth water is, and in particular, that to-day it has become, in a

great many places, the providential means of saving the vineyards from the attacks of an underground enemy (the phylloxera) which threatens to make them disappear."

To give an idea of the extent of and importance attached to this governmental move in the interests of irrigation, I mention the fact that the commission, or "jury," placed in charge of the examinations, awarding of premiums, and reporting results, was composed of (1) the inspector-general of agriculture of France, president; (2) a deputy inspector-general of agriculture, vice-president; (3) the life secretary of the central society of agriculture of France, reporter; (4) the general secretary of the society of agriculture of the department of the Mouths of the Rhone; (5) the director of the agricultural college of Paillerols, Lower Alps; (6) an engineer of the government civil engineer corps, and (7) the vice-president of the society of agriculture of the department of the Herault. And it is further notable in this connection that the reports of this commission for the three years of 1875–76–77 take up four large quarto volumes, containing 1,980 pages of printed text with numerous maps and tables.

The decree quoted was for the one year of 1875, and the one department of the Mouths of the Rhone, and was not only followed by a similar decree and concourse and awarding of prizes each year in that department, but, also, by like action in other departments; as, for instance, in that of Vaucluse, for which the first action was taken in 1876. Thus, gradually progressing through all the departments where irrigation is practiced, the government, through its department of agriculture, is not only making this most thorough and intelligent study of the use of water in irrigation, but is directly encouraging the irrigators, in the bringing of them together for discussion, by awarding prizes for the best examples of irrigation practice, and by publishing in detail all the data thus acquired.

And further than this, not stopping at an examination and study of practice at home, this department has sent well trained and intelligent agricultural engineers to other countries where considerable progress is being made in the use of water in irrigation, with instructions to personally study the systems and the practice, and collect all available data, in print and by verbal communication, that may be worthy of attention in the endeavor to enlighten and encourage its own agriculturists and guide its legislative and ad-

ministrative officers. Thus, the irrigation works and practice of California, in common with those of others of the United States, have been recently inspected and studied by a special agent, and, in common with other points where information might be had, the office of the State Engineer of California has been quite thoroughly examined and data collected therein; and all for the benefit of the irrigators and the agriculture of France.

Statistical Atlas of Irrigation.[1]

And still again in another channel, we find the spirit of enterprise and enlightenment moving the French government in this connection. Under a ministerial order issued in 1869 a special commission, composed of nine civil engineers and scientific and practical agriculturists of high standing, was appointed for the purpose of "revising, coördinating, and preparing for publication the statistics relative to the amount of water available in the streams, and the use made of it in the various departments of France." It was ordered that the chief of engineers should instruct all departmental engineers and conductors engaged in the hydraulic service to collect and forward the information desired from their several fields of operation, according to certain prescribed forms, and that this data should be turned over to the commission for its work.

The investigation has been progressing continuously, but is yet unfinished. Several partial and local tables have been published, and a set of eighty-five departmental hydrographic maps, which form the basis for the study, have been issued for the use of the collectors. The work is formulated with the view of treating the regulation of the waters and their use, as a business proposition. The government undertakes to find out exactly what waters are available from year to year, and exactly what is done with them. The work once done can be kept posted from year to year with comparatively light work and expense, and will furnish that data from which economy and efficiency can be studied and published. So that if there is water available it will be publicly known; if there is water wasted and used unskillfully, it will be publicly known in a way to rebuke the users; if there is water used with economy and skill worthy of special note, it will be publicly known in a way to reflect credit upon those who thus utilize it.

[1] See, Ministerial circular, July 4, 1878, *Les Annales des Ponts et Chaussées*, Vol. CXXXIX, p. 1122.

There can be no question but that this is the real way to regulate the use of waters. Public knowledge of what is good in practice will bring imitation and economy as an average outcome; public knowledge of what is reprehensible and wasteful will bring condemnation, and a reform of the wrong. These are, in substance, the sentiments to be found in late French state papers relating to irrigation, and with the expression of them, I leave the subject of the progress of French governmental policy towards the irrigation interest, for they are the evidence of the crowning feature of a long line of intelligent actions of a government fully awake to the best interests of its people.

SECTION II.

Notable Instances of Enterprise and Encouragement.

In this section I present a series of abstracts of the laws authorizing, and the decrees and agreements regulating the construction and maintenance of the most notable canals of irrigation in France. It will be seen that they are scattered in date over the period of the past fifty years, and in character range the whole field indicated in the preceding section. The study of these measures, together with that connected with the canal of the Bourne, of which a closer analysis has already been given, will lead to an appreciation of the fact that irrigation is a subject for careful and thoughtful treatment at the hands of the legislator.

Canal Des Alpines.[1]

In the year 1839 the concession for the northern branch of the Alpines canal and its secondary ditches was offered for sale. The concession was perpetual, and allowed five cubic metres of water per second to be derived from the river Durance, in time of ordinary low-water, in addition to the right formerly authorized on the portion of the said branch already opened. The concessionary was authorized to receive as his profit a rent from the irrigators which should not exceed a litre and a half of corn of the country of best quality for each *are* of land irrigated, regardless of its nature. The buyer could expropriate lands for the construction of the

[1] See, Royal ordinance of July 9, 1839, *Les Annales des Ponts et Chaussées*, Vol. XVII, p. 289, *et seq.*

canal and its branches, in accordance with the law; and the owners of lands to be irrigated by the waters of the canal were freed from any increase of landed taxes over that then paid on them, for twenty-five years from the time fixed for the completion of the canal.

General plans had to be presented within one year from time of sale; the works to be commenced within six months from the governmental approbation of the project, and to be executed within six years from the final consummation of the sale. Forfeiture to be incurred for failure to comply with either or both of the two last mentioned conditions.

The landed tax was established on the canal for only the actual ground occupied by it, rated as lands of the first quality. Any portion of the water conceded which within twelve years should not have been employed in irrigation, was to revert to the state, which could make it the object of a new concession.

The buyers were obliged to deposit, after the sale, in the treasury, the sum of 50,000 francs ($10,000). This sum to be increased to 100,000 francs in the three months which follow the approval of the sale. The said sum to be returned in fourths, in proportion to the amounts of work executed, and in case of forfeiture, the portions of the security not returned, to be confiscated by the treasury. The enterprise was sold on the twentieth of June, 1839, to three individuals, as agents for the "General Drainage Company," with an abatement of two thirds per cent; that is, the annual rent was to be one litre forty-nine centilitres of corn for each *are* (equivalent to 64 quarts per acre) of land irrigated.

Canal of Carpentras.[1]

The administration was authorized by a special law to concede six cubic metres (212 cub. feet) of water per second to be taken from the river Durance and used in the irrigation of lands belonging to the communities of Saumannes, l'Isle, and others. The water could, however, be cut off from the canal by order of the prefect whenever such measure was deemed necessary either for the interest of navigation or for the protection of the interests of those who had previous claims to the water. The enterprise was declared of public utility and the canal only taxed for the actual ground occupied by it, classified as of first quality. The lands to be irri-

[1] See, Royal order of July 9, 1852, *Les Annales des Ponts et Chaussées*, Vol. XLVIII, p. 523, *et seq.*

gated from the canal were not to have their taxes raised over the assessment at that time, for twenty-five years from the date of the completion of the canal.

Canal of Cadenet.[1]

This concession was made to a number of irrigating proprietors forming a syndical association, and consisted in permission to derive three cubic metres of water from the river Durance, and authority to contract loans to be first approved of by government or by the prefect, provided the debt of the syndicate did not exceed 50,000 francs ($10,000) at the time the loan was asked for. This syndical association was called the *Society of the Canal of Cadenet*, and was formed with the object of irrigating certain lands belonging to the subscribers thereto, but as there were many persons and communities whose lands could be irrigated by the canal, but who did not subscribe, this decree provided that these parties could join the society either during or after its construction on the same terms as the original founders.

The affairs of the society were administered by a syndicate composed of seven members to be named by the prefect. One of the members was also named by the prefect to fill the place of director of this syndicate, and attend to the business connected with the construction, maintenance, and operation of the canal. The enterprise was declared of public utility, but did not receive any assistance from the government, either in the shape of subsidy or remission of taxes. On the contrary, it seems to have been burdened with conditions, of which the following are the most important:

1. Four tenths of a cubic metre of water, per second, had to be returned into the Durance by the escape canal of Pertuis.

2. The waters of the canal not utilized for irrigation had to be returned into the Durance at a specified point thereon.

3. It had to carry out all its works in conformity with the direction of engineers appointed by government, but paid by the society itself.

Canal of St. Martery.

The canal of St. Martery, under a law, agreement, and schedule, passed and ratified in 1866, was conceded to three individuals,

[1] See, Royal decree of November 18, 1854, *Les Annales des Ponts et Chaussées*, Vol. LVI, p. 179.

[2] See, *Les Annales des Ponts et Chaussées*, Vol. LXXXVIII, p. 162, *et seq.;* Law of May 16, 1866.

representing a company of English capitalists, called the *General Irrigation and Water-Supply Company of France*, for a period of fifty years, and thereafter to belong in perpetuity to the department of the Upper Garonne, wherein it is situated. The canal and all its secondary and distributing works were to be built by the company, at its sole expense and risk, and managed and maintained by it during the term of the concession, and thereafter by the department.

The general government granted a subsidy of 3,000,000 francs to the work, to be paid in tenth parts, in proportion to the advancement of the principal canal, but depending on the resources available to the administration from time to time for such purposes. The payments were to be made on the certificates of the engineers, to the effect that a greater sum had been expended on the works, etc., since the last payment than the amount of the installment demanded. A reserve of 500,000 francs was to be made from the two last installments, of which 300,000 francs were to be paid over upon the final approval of the main canal, and 200,000 after the final approval of the secondary canals, which final approvals were to be one year after the claim of completion and the provisional reception of the works.

Complete final plans for the main work were to be submitted to the administration for approval, and the works to be commenced, under pain of forfeiture of rights and guarantees, within one year of the date of the concession: the main canal to be finished within five years, and the secondary canals within two years after approval of locations; and the company was required to deposit the sum of 150,000 francs as security for the faithful performance of its engagement.

To assist the company's credit for the securing of capital necessary for the construction of the works and the other purposes of the enterprise, the department of the Upper Garonne was authorized to and did engage to contract, upon the demand of the company and for its benefit, with the Credit Foncier of France, under a law authorizing such negotiations, one or more loans to the maximum amount of 4,000,000 francs. These loans were to be contracted upon the basis of the company's assured income from subscribed water rents, after the works were completed to deliver the water, and the collecting and management of the income was to be assigned to the department for that purpose, provision being made for maintenance and operation of works, the company at

the same time pledging its faith and credit in the protection of the department from loss or embarrassment on account of the loans. The estimated irrigable area was 14,000 hectares—about 34,600 acres.

Subscriptions for the use of water were required to be made for fifty-year periods; the right of irrigation belonging to the land subscribed for, and going with it, no matter into whose hands it passes, not being transferable to other lands by the owner, and not forfeitable by the original lands after the expiration of the fifty years except by the owner's consent. The quantity of water to be furnished for irrigation was fixed at three fourths of a litre per second per hectare (equivalent to a duty of 93.25 acres per cubic foot per second); and provision was made for a rebate on the rents in case of an insufficiency of supply for any term of more than thirty days duration during the six months of the irrigation season.

The price of water for irrigation was fixed at 25 francs per hectare ($1 95 per acre) per year, for all subscriptions made during the first two months of the examination of the project, at 35 francs ($2 73 per acre) for subscriptions made after that time and before the promulgation of the schedule, and 50 francs ($3 91 per acre) for all subscriptions made thereafter. It was stipulated that sale by the quantity of water might be substituted for sale by the surface of land irrigated, and the substitution was to be made of the prices named above, for the *half* litre of water per second, with the provisions that water thus taken should be used only on contiguous tracts, that all of the lands should be pledged for the payment of the water rent, and that no subscription would be received for less than a half litre per second.

The company was also bound to lend to each and every land owner who subscribed for water, a sum equal to one hundred francs per hectare ($7 69 per acre) subscribed for, to be used by him in the preparation of his land for irrigation. This sum to be advanced in two parts, the first half on demand, and the second half three months after the first irrigation on lands prepared with the first half, and where it shall have been shown that the advance has been judiciously expended. The sums thus advanced were to be repaid in installments which, with interest, amounted to 6.25 per cent per annum for the fifty years, on the amount borrowed.

Canal of Siagne.[1]

A similar concession was made in 1866, also to the English company, for the canal of the Siagne and Loup, in the department of the Maritime Alps, under very similar conditions and for a like period to that governing the case of the Saint Martery. In this instance the town of Cannes was to be supplied with water for domestic purposes, as well as the surrounding country to be irrigated, and it was made the co-grantee, to own the works in perpetuity, after the first fifty years when owned by the company.

The general government granted a concession of 500,000 francs ($100,000), and the town was to loan its credit to raise money for use on the works by the company, as in the case of the St. Martery, taking control of the revenue of the company from water rents, as a basis upon which to capitalize for a loan, and being in turn assured from loss or embarrassment by the obligations of the company.

Canal of Siagnole.[2]

This concession was made to five individuals forming a society, for fifty years, and afterwards in perpetuity to the department of Var. The society received a subvention of 30,000 francs ($6,000), and was authorized to derive from the Siagnole three hundred litres (10.6 cub. feet) of water per second, provided they at all times left at least a volume of water in the bed of the river such that the discharge might be one hundred litres per second above the dam of the manufactories of Mons.

The department was authorized to contract a loan, the interest of which, with all expenses connected with it, should not exceed three fourths of the amount of the rents of the canal, in order to aid the society in the construction of the canal. The total amount of this loan was not to exceed 90,000 francs ($18,000). The department was to receive the rents from the irrigators, and, after paying the interest and other expenses and installments of the principal, to hand the balance over to the society each year, until the debt should be paid off, when all the rents were to be paid to the society.

The works of the canal were declared to be of public utility; and the tax was to be only for the simple amount of land occupied

[1] See, Law of Aug. 25, 1866, *Les Annales des Ponts et Chaussées*, Vol. LXXXVIII, p. 385, *et seq.*

[2] See, Decree of June 14, 1870, *Les Annales des Ponts et Chaussées*, Vol. CIII, p. 1206.

by the main canal and the secondary ditches, but the buildings and warehouses of the society were subjected to the usual tax. The principal canal and secondary canals had to be entirely finished, and put in operation in the space of two years, counting from the decree of concession. The tertiary ditches, however, had only to be undertaken when the subscriptions would amount to six per cent of the expenses of their construction; but once begun, they had to be finished in two years. Forfeiture was to be incurred for failure to construct in the stipulated time.

The society was authorized to collect rents at the rate of forty francs per litre ($218 66 per cub. foot) per second for periodical waters of irrigation. The privilege of subscribing for less than a litre was given to the irrigators, but with the proviso, that for every quarter of a litre, or less than that quantity, there should be paid a rent of fifteen francs ($3).

The rents were to be fifty francs per litre ($273 29 per cub. foot) per second, if they were not subscribed for until after the decree of the concession, and the proprietors could free themselves from all rent charges by paying the capital, fixed at eight hundred francs per litre ($4,374 35 per cub. foot), provided they declared their intention so to do in the year following the decree of concession. Every time, however, the subscriber freed himself by depositing a capital, the society was obliged to deposit in the landed bank of France a sum necessary to constitute, by the accumulation of interest compounded for fifty years, the rent to be paid during the forty-nine years following. The irrigating proprietors were obliged to give free right of way under pain of not having the right to irrigate. Every proprietor who subscribed for a volume of water of twenty litres per second could have that quantity in a continuous stream by payment of the corresponding rent—this water to be delivered to him separately by a single gate. This same rule held good for a number of individuals, clubbing together to receive their water jointly through a separate gate.

The company had to deposit 3,000 francs ($600) as security before the decree of concession was made, and this sum was to be restored to them when the expenditure on the canal amounted to 20,000 francs ($4,000), as certified to by the engineer-in-chief and the prefect of the department of Var. In case of reduction or remittance of the rents from insufficiency of water, the year in which such reduction or remittance took place was not to count as one of the fifty years granted by the concession.

In this case we have an instance of a direct subvention to a society to assist in the construction of a canal, additional assistance in the shape of a loan authorized to be raised by one of the departments, and the transfer of the property, after fifty years, for the sole benefit of a department; also remission of taxes on the enterprise, except for buildings and land actually occupied.

Canal of the Bourne.[1]

The rights, privileges, and benefits for the canal of the Bourne, department of Drôme, hereinbefore spoken of, were conceded in 1874, for a period of ninety-nine years, to three individuals for the benefit of a society or company, to be formed to carry out the project. The district comprised 22,000 hectares (54,340 acres) of which 10,500 hectares (25,935 acres) were reckoned as irrigable, and a volume of 7 cubic metres (247 cubic feet) of water per second was allowed for the purpose of irrigation and other uses contemplated.

According to the terms of the law and agreement and schedule annexed, the government allowed the company an advance or subsidy of 2,900,000 francs ($580,000), which amount was one third of the estimated cost of the works inclusive of main, secondary, and tertiary canals and structures. This subsidy was not finally granted, however, until after the company or society had been formed and subscriptions for water been secured to the extent of 3,000 litres per second at the rate of fifty francs per litre. And the subsidy or advance was to be paid in installments on completion of work in cost and value to the amount of three times the sum paid in each instance, one tenth of the whole being held back till the final completion of the work.

The company was to build all the works, and transfer them to the state at the expiration of the term of the concession, in good order. The secondary canals and their tertiary branches may each go into the hands of a syndicate association of irrigators, for operation, in the sub-district served by it, should the landholders choose thus to organize and undertake the management.

The rate of water rents, for irrigation, was fixed at 50 francs per litre of flow for those persons who subscribed before the opening of the works, and 60 francs per litre for those who subscribed

[1] See, Law of May 21, 1874, *Les Annales des Ponts et Chaussées*, Vol. CXXVI, p. 451, *et seq.;* also, De Passy, Appendices 5 and 6.

afterwards. Supposing the entire volume of water conceded to be sold at the minimum figure, the revenue of the company would be (7 cubic metres=7,000 litres@50 francs) 350,000 francs per annum, which in fifty years would yield a return of 17,500,000 francs, on the outlay to the company, which was expected to amount to 5,800,000 francs—being two thirds of the total estimated cost of the works, the government advancing the other third.

Canal of the Rhône.[1]

This concession was made to three individuals acting for and in the name of a society then forming. The volume of water to be derived from the Rhône was 2,500 litres (88.3 cub. feet) per second in low-water. The concession to last for ninety-nine years, and the society to receive from the government a subvention of 900,000 francs ($180,000), provided the company could show subscriptions for at least 1,500 hectares (3,707 acres) of land to be irrigated. The first installment was not to be paid until the society had expended 800,000 francs ($160,000). The three first fourths of the subvention to be devoted to the principal canal, the balance to be paid to the society on the provisional reception of the canal by government, with the exception of one tenth, which was to be paid after its final reception. The society was authorized to contract one or more loans, the interest and expenses in connection with which were not to exceed 15,000 francs ($3,000). The first loan not to exceed 800,000 francs ($160,000), and no loan or issue of bonds to be made except with the authorization of the minister of public works, and after the entire subscription of the capital shares, and the employment in the works of four fifths of this capital.

The society engaged to execute at its expense all the works of the principal canal, secondary, and tertiary branches, as well as the works necessary to deliver to and carry away from the property of every one desiring it, the water for irrigation and domestic uses; to finish the main canal and put it in operation within the space of five years from the date of concession, and to complete all necessary canals within one year of the time in which they were commenced. All the expenses of operation and maintenance were to be paid by the society, and it was to receive all incomes

[1] See, Decree of August 7, 1878, *Les Annales des Ponts et Chaussées*, Vol. CXLIII, p. 531.

from the canal during the term of the concession, at the expiration of which the canal was to be returned to the state. The annual rent was fixed at 40 francs per hectare ($3 12 per acre) for those who subscribed before the decree of concession, and 60 francs per hectare ($4 69 per acre) for those subscribing afterwards. The first subscribers had the privilege of afterwards augmenting their original subscriptions by an equal amount at the rate of 40 francs per hectare, but anything in excess of this amount had to be paid for at 60 francs per hectare; the right to the use of the water being in all cases inherent to the land and not to the individual.

The society had to give a security of 60,000 francs ($12,000) in cash, to be returned to them when they had expended on the works 200,000 francs ($40,000). The works were declared to be of public utility, and entitled to the exercise of the power of eminent domain. The society agreed to pay to the state an annual rent of one franc, and the state reserved the privilege of revising this once every ten years.

In this concession we have an instance of direct assistance in the shape of a subsidy; the concession to last ninety-nine years, at the end of which time the works to be handed over to the state. The company was also authorized to contract one or more loans for its use in the construction of the works.

Canal of Vésubie.[1]

This concession was given to the *General Water Company of France*, under the direction of the engineer-in-chief of bridges and roads (the construction and management of these irrigation works being thus measurably a public work of the state), for a period of ninety-four years, and afterwards in perpetuity to the town of Nice. The enterprise was declared to be of public utility, and the General Water Company received a subvention from the state of 2,400,000 francs ($480,000).

The canal was to be taken from the river Vésubie, and so constructed as to carry at least four cubic metres (141.2 cub. feet) of water per second at the head of the first secondary canal, this discharge being fixed for the execution of the work, but not as a determinate quantity of water which had to be diverted by the company.

[1] See, Law of December 23, 1878, *Les Annales des Ponts et Chaussées*, Vol. CXLIV, p. 1397.

The company had to pay all expenses of construction as well as all indemnities for temporary occupation or deterioration of lands and all damages resulting from the works. All the expenses in connection with acquiring lands for the location of headworks of the canal and its dependencies, for modification, destruction, or stoppage of manufactories, for disturbances of users of water, had to be supported one half by the company and one half by the town of Nice, the company paying the town, however, 100,000 francs towards these expenses. The indemnities due for the establishment of the tertiary canals and the distribution ditches for water, or for obtaining the passage of these waters over intermediate lands by right of simple servitude, had to be paid by the proprietors interested, who had to give proper titles for the same to the company.

The community of Nice granted to the company the lands which were required for the establishment of the reservoirs and their dependencies necessary for supplying the town with water, and the gratuitous disposition of all the ways of communication belonging to the community for the establishment of canals, ditches, conduits, etc., so long as such use did not interfere with their usefulness as means of communication. It also agreed to pay to the company an annual rent of 80,000 francs ($16,000), representing the municipal subscription for a weekly delivery of 60,000 cubic metres of water. It was, however, understood that when the gross income of the company should amount to 180,000 francs ($36,000), municipal subscriptions included, any excess of income over this figure was to go towards the reduction of the annuity of the town, so as to limit it to 60,000 francs.

The company received authority to collect rents from the users of water, not in the town, as follows: For fifty centilitres, per second, 46 francs ($513 96 per cub. foot) per season of irrigation, for one litre, per second, 80 francs ($434 56 per cub. foot). There were no subscriptions received for periodical water for a less amount than half a litre per second. The buildings and storehouses of the canal and its dependencies had to pay the usual taxes, but the enterprise was only taxed for the actual amount of land occupied by it, reckoned as land of the first quality.

We have in this case an instance of the construction and management of a canal largely at the expense of the state, for ninety-four years, and then the transfer of it for the sole benefit of a

municipality in perpetuity. We have here also, a remission of all taxes on the enterprise, except for its buildings and the land actually occupied by it.

The Pierre-Latte Canal.[1]

A recent instance of an enterprise of considerable magnitude to which the state made a large advance, and also guaranteed interest in a large amount, is the case of the extension and enlargement of the Pierre-latte canal, in the department of Vaucluse, the law for which was passed in 1880, making the concession to certain individuals for the benefit of a society to be formed to carry out the work. The concession was for eight cubic metres (282.4 cubic feet) of water per second from the Rhone, to irrigate about 20,000 hectares (49,400 acres) of land, and for a term of ninety-nine years.

The estimated cost of the work, including main, secondary, and tertiary canals and works, was 8,000,000 francs, of which the state was to advance 2,000,000 on the work, in installments in amounts not exceeding one third the actual expenditure at any time according to detailed engineering reports. In addition to this, the state guaranteed to the concessionary society undertaking to construct and manage the works, for a period of fifty years, a revenue of 4.65 per cent per annum on the remaining 6,000,000 of funds estimated to complete the work, and which the society was to raise for its capital.

This advance and guarantee, however, were not made until a certain revenue had been assured by subscriptions for water by the land-holding irrigators, so that the extent of government liability for interest was limited to 167,000 francs per annum. And in case the income from the canal grows to be more than enough to produce the rate guaranteed by the state over and above the cost of operation, etc., one half this net revenue is to go to the state.

After the fifty years of the guarantee of interest, the state is to receive during the balance of the period of concession an interest of four per cent in return on the sum of the net amounts advanced by it as interest. At the end of the ninety-nine years of the concession, the canal and all its dependencies are to become the property of the state. The provisions with respect to the management and maintenance of the secondary and branch canals by a

[1] See, Law of August 2, 1880, *Les Annales des Ponts et Chaussées*, Vol. CLI, p. 21, *et seq.*

syndicate of irrigators in each case, were the same for this canal as for the canal of the Bourne.

The Canals Manosque and Herault.

A late instance of the state loaning money for the construction of irrigation works is the case of the *Manosque* canal, in the department of the Lower Alps, sanctioned by law in 1881.[1]

The canal was to take two cubic metres of water per second from the Durance river for irrigation. The proprietors of lands to be irrigated were to engage to take water to a certain amount at a fixed rate, and, for fifty years, and to form themselves into a syndical association to manage the canal; the state, thereupon, to advance all the money for the enterprise, amounting to two million francs, and to receive in return, during the period of fifty years, seventy per cent of the gross proceeds from water rents, which it was estimated would repay the state with interest.

The following is another instance of both a subsidy and a guarantee of interest on capital invested, brought into form by a law of 1882:

Canal of the *Hérault*, department of the Hérault, to take 3,500 litres of water at low-water, and 5,000 at time of flood, from the Hérault river, for the irrigation and submersion of lands: to be built by a syndicate of land-holding irrigators, at an estimated cost of 6,300,000 francs. The state was to give a subsidy equal to one third of the total cost of the works, and to guarantee interest for fifty years at the rate of 4.65 per cent on 4,200,000 francs, the balance of money to be raised. This guarantee could only take effect after subscriptions had been made for water for 2,000 hectares of lands, at rates about fifty francs per litre.[2]

Other Late Works.

In other instances the state has constructed irrigation works, and either turned them over to the landholders to manage, or reserved them for management as public works of the state.

An instance of the first above mentioned class of action, for which the law was passed in 1881, is that of the *Ventaron* canal, in the departments of the Upper and the Lower Alps, and taking

[1] See, Law of July 7, 1881, *Les Annales des Ponts et Chaussées*, Vol. CLII, p. 1132.
[2] See, Law of July 13, 1882, *Les Annales des Ponts et Chaussées*, Vol. CLVIII, p. 1298.

water from the Durance river. The state granted the associated irrigators a water-right of 2,500 litres of water per second, on a nominal payment of one franc per annum, and then undertook to construct the main canal necessary to deliver the water, at a cost not to exceed 1,733,000 francs, estimated to be two thirds the total cost of the whole works, and to turn it over to the associated irrigators, for use forever, when they had built the necessary secondary canals and smaller ditches for distributing the water.[1]

Another instance of this kind of action on the part of the government is that of the canal of *Petite-Vence*, department of Isère, taking water from the government canal Roize, and built for the irrigation and submerging of lands, at an estimated cost of 81,000 francs, of which the government was to expend two thirds on the main works, and the associated irrigators one third on the secondary canals and other works, the association to manage the canal forever.[2]

Of irrigation canals, constructed on government account as public works, the following are of late dates:

Canal of *Malpas*, department of Hérault, taking water from the navigation canal of Midi, for the submersion of two hundred and ninety-six hectares, to be built by the state, at an estimated cost of 86,000 francs.[3]

Canal of *Saint Marcel*, department of Aude, taking water from the canal of Midi, for the submersion of three hundred and eighty-five hectares, to be executed by the state, at an estimated cost of 130,000 francs.

Canal of *Argeliers*, department of Aude, taking water from the canal of Midi, for the submersion of one hundred and five hectares of land, to be executed by the state, at an estimated expense of 80,000 francs.[4]

Canal of *Raonnel*, department of Aude, taking water from the canal of the *Robine*, and intended for the submersion of five hundred and three hectares of land, executed by the state, at an estimated cost of 320,000 francs.[5]

[1] See, Law of July 20, 1881, *Les Annales des Ponts et Chaussées*, Vol. CLVII, p. 5.
[2] See, Law of August 3, 1881, *Les Annales des Ponts et Chaussées*, Vol. CLVII, p. 571.
[3] See, Law of March 3, 1881, *Les Annales des Ponts et Chaussées*, Vol. CLII, p. 1263.
[4] See, Law of September 22, 1880, *Les Annales des Ponts et Chaussées*, Vol. CLI, p. 483.
[5] See, Law of August 17, 1881, *Les Annales des Ponts et Chaussées*, Vol. CLVII, p. 573.

AUTHORITIES FOR CHAPTER VIII.

Dumont.—[Work cited as an authority for Chapter II.] See, Book II, Chapter VI, pp. 280–330.

De Passy.—[Work cited as an authority for Chapter II.] See, Chapter I, pp. 79–130.

Barral.—[Works cited as authorities for Chapter VII.] See, Chapters I and II of each volume, the descriptions of the several canals in other chapters, and the chapters relating to syndicate associations, canal companies, land proprietorship, and population.

Les Annales des Ponts et Chaussées.—[Works cited as an authority for Chapter III.] See, Vol. XVII, p. 289, *et seq.;* Vol. XLVIII, p. 523, *et seq.;* Vol. LXXXVIII, p. 162, *et seq.;* Vol. LXXXVIII, p. 385, *et seq.;* Vol. CIII, p. 1205, *et seq.;* Vol. CXXVI, p. 451, *et seq.;* Vol. CXLIII, p. 531, *et seq.;* Vol. CXLIV, p. 1397, *et seq.;* Vol. CLI, p. 21, *et seq.;* Vol. CLVIII, p. 1298, *et seq.;* Vol. CLVII, p. 5, *et seq.;* Vol. CLII, p. 1263, *et seq.;* Vol. CL, p. 48, *et seq.;* Vol. CLVII, p. 573, *et seq.;* and elsewhere in the publication.

IRRIGATION LEGISLATION AND ADMINISTRATION.

ITALY.

ITALIAN IRRIGATION LEGISLATION.

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Italian Irrigation Legislation.

INTRODUCTION.

The valley of the Po, in northern Italy, is very generally regarded, and popularly spoken of, as the classic land of irrigation; and, indeed, if there is a region worthy of the name, these plains of Piedmont, Lombardy, and Venetia are deserving of it, for there are found the largest number of the best works of olden and of modern times, in the department of hydraulic construction for irrigation, which exist in any land, and there irrigation itself was first, after the dark ages, studied as a science and practiced as an art.

The valley is about two hundred miles in length, and varies from thirty to sixty in width, being bounded on the north by the Alps, and on the south by the Apennine range of mountains. Throughout its length, and keeping nearest the foot of the southern range, runs the Po, from west to east, a large river; while entering it, and joining this main drainage way, from the bordering mountain regions, are thirty or more other streams, of varied sizes and character; of which at least half a dozen are great irrigation feeders; and twice as many more contribute notably to the water-supply used in agriculture.

This valley of the Po is like our own of the Sacramento in size, and form, and disposition of water-ways, but is much better supplied with streams, draining its adjoining mountains, and itself receives, on the average, about seventy-five to one hundred per cent more rainfall.

Irrigation in this region was probably commenced by the Romans, but the greater works of the country date since the tenth century; most of them were built after the fourteenth and

before the beginning of the present century; while several notable ones, and the one of chief importance, have been constructed during the present generation. These works are constructed in the most substantial manner, with stone reveted banks in many places, and with masonry headworks, bridges, outlets, sluiceways, overfalls, syphons, and other structures. The volumes of water handled far exceed any conducted and distributed in this country, and the practice of irrigation is very much more refined in its details than is our practice, except in some notable instances with us.

The customs of the people of this region have crystallized into laws and regulations covering the whole range of points and subjects met with in the development of irrigation works and practice, so that we have here a rich mine of data in which we may find principles, and trace the working and results of principles, applicable to, and to be heeded in the formulation of the irrigation code of the future for California.

This development came to a point of completeness worthy of special attention, in the states of Lombardy and Piedmont, particularly, before the recent unification of the government of all Italy. So that I shall first trace as fully as necessary the systems of the Lombards and Piedmontese, and then present the law of all Italy, as it now exists, on the important points of our inquiry.

CHAPTER IX.—ITALY[1];

RIGHT OF PROPERTY IN AND CONTROL OF WATER-COURSES AND WATER SOURCES.

SECTION I.—*Ownership and Control of Water-Courses and Waters.*
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SECTION I.

OWNERSHIP AND CONTROL OF WATER-COURSES AND WATERS.

Basis of Property Rights in Water-Courses.[1]

For five centuries after the fall of the Roman empire of the west, the people of the Italian peninsula were tormented by successive invasions of barbaric tribes from different quarters. It becoming apparent that the ruling families of sovereigns of the various kingdoms, could not protect their subjects from pillage, the people concluded to protect themselves, and hence grew the spirit of independence upon which was formed the Italian republics of the middle ages.

Thus, during the tenth century the residents of the principal cities with the surrounding country, each organized an independent state with a representative form of government, and elected administrative officers. Forming leagues or confederacies at later

[1] See, Sismondi, Smith, and De Buffon.

dates, these states became republics, several of which, particularly on the seacoast and in the south of Italy, retained their independent existence with some vicissitudes of fortune, as late as the present century; but those in the north of Italy—the upper part of the valley of the Po, the quarter where irrigation has developed to the greatest extent—soon gave way to pressure of invasion from without, and to the machinations of local magnates, and the feudal system here made rapid progress to full development.

Rise and Fall of the Feudal System.

In northern Italy the independence of the feudal lords was most complete, and the hereditary principle was recognized not only as relating to the possession of local governing power, but to the possession and ownership of land. The counts took every means to oppress the allodial land proprietors who held titles from former rulers or under preceding forms of law. From such persistent and covert persecution, even the authority of the kings was often powerless to afford protection. Many private individuals voluntarily surrendered their allodial titles and consented to hold their property as the vassals of the counts, in order to get protection from the local potentate. Thus it came to pass that the feudal system of land tenure was established—none but persons of noble birth could hold property in their own right; all others held it as vassals of the dukes, counts, marquises, margraves, etc., and the land was known as the *feif* of the ruler.

The waters of all streams, which under senatorial and imperial Rome had been the common property of all the people, and the rivers, which had been the property of the sovereign power or nation, and which during the barbarian rule became the property of the rulers themselves, and then of the kings who followed them, and later of the people of the republics, now became the property of the local feudal lords.

The Roman laws had been lost to the people, and all records of them were at one time thought to have been destroyed; but among the unwritten laws of the country—in the customary law of the people, with respect to the management and distribution of waters in irrigation—were to be traced the influence of those principles which we find to have existed in the Roman system.

Documents of the tenth and eleventh centuries, recording and formulating previous practice, bear witness that "the principles of

the Roman law in matters connected with the use of waters had never been wholly lost sight of, but, embodied in the traditions of the people, had continued in unwritten form to influence the development of agriculture. * * * The irruption of the barbarians brought into Northern Italy Germanic rights and the feudal laws. All the rights appertaining to the public centered in the feudal lord of a commune, a province, or a kingdom, becoming his absolute property. * * * It was not for purposes of police that the feudal superiors exercised all the rights of masters over the water-courses, but that their right of *absolute property* necessarily absorbed everything previously held to belong to the community. There existed, in fact, merely the relations of masters and subjects."—[Smith, Vol. II, p. 124; quoting Giovanetti.

"At the peace of Constance, in 1183, the Italian towns of the Lombard League recovered all the rights previously vested in the feudal superiors, and from that time the rivers have been held to be public property. These rights were then vested in the cities themselves, which each exercised authority over a certain extent of adjoining territory."—[*Idem*, p. 134.

From the Earliest to the Present Law.

The earliest recorded laws of northern Italy date from the tenth century, when Otho the Great, emperor of Germany, granted the cities of Lombardy the right to live according to their ancient laws and local customs, which included their customs and regulations regarding irrigation.

A code of the republic of Milan, dated in the early part of the thirteenth century, contains an extended series of provisions regulating the use of water in irrigation, the right of way to conduct it in canals, and the privilege of diverting it from streams.

The laws of the republic of Venice, dated in 1455, recognize the ownership of running waters as being in the government as representing the whole people, forbid the diversion of water from the streams without "the requisite authority from competent magistrates," and provide that the waters may be used "by every inhabitant of the territory of Verona" "for the irrigation of his property," after obtaining the requisite authority and "under the condition that he inflicts no injury on parties possessing older rights to the same waters."—[Smith, Vol. II, p. 121.

When the monarchic element was introduced, there were constant struggles between the royal governments and municipalities on the question of the right to the running waters.

The result of these struggles was a recognition on the part of

the governments of certain water-rights already utilized, but the successful assertion of ownership by them of all other waters. So that, to quote again the author above referred to: "In Northern Italy the waters of all streams, whether navigable or non-navigable, appertain to the royal or public domain."

Ownership: Lombardy, Piedmont—all Italy.[1]

During a large part of the present century, and until 1865, the valley of the Po was under several separate governments, so that even the general laws were not uniform for all of this irrigation region, until a very recent date, and even yet regulations established by some of the local governments are still in force in the states for which they were promulgated.

In what will hereafter be said, reference will be made to the laws of Piedmont and to those of Lombardy, as they existed a few years ago, and until the merging of the governments into that of the kingdom of Italy, and then, for each heading, the provisions of the general civil code of Italy, known as the Code of Victor Emmanuel, and promulgated in 1865, will be given.

Lombardy.—That which was said in the final paragraph of the preceding section, had reference more particularly to Lombardy or the Lombardo-Venetian Kingdom, and as it existed under Austrian dominance.

The old established claim of the cities, communes, and associations of proprietors, and of noble individuals, to the supplies of water which they had for long periods of time actually utilized, having been recognized, the government asserted and maintained its ownership to all natural streams whether navigable or not. Diversions of water under the old claims were subjected to governmental regulation, and no new diversions could be made, or new work built in the stream beds without special administrative authorization.

But when the government had come into full control of the streams, so many claims to their waters had grown up, that the propertyship of the state was almost a barren one, and it found itself heir to a struggle for the control of rights unregulated with respect to the public, and unadjusted amongst themselves.

[1] See, Smith, Vol. II, Part IV, pp. 116–146, 248–263; also, the Sardinian Codes, the Italian Civil Code.

Piedmont.—In the kingdom of Piedmont, also, the right of property in all running water was reserved to the state. This reservation applied not merely to the larger class of rivers, but also to the streams and torrents, the waters of which could only be used under specific grants from the government.

A royal ordinance concerning the use of waters, and dated in 1817, commences with the following articles:

"I. All the rivers and torrents in the state are royalties, and in consequence they appertain to the royal domain.

"II. No one can establish channels or canals for the introduction of water into his property, either for the use of mills or other structures, unless he possesses a legitimate title to the same, or has obtained a royal grant."—[Smith, Vol. 2, p. 248.

At a later date (1828) a royal instruction to the intendants of provinces, concerning the regulation of water-courses, commenced as follows:

"All the rivers and torrents in the state are *regali*, and belong in consequence to the royal domain.

"Hence, therefore, the sovereign permission is necessary before the waters can be used in any way whatever, either in agriculture or industry."—[Smith, Vol 2, p. 249.

The civil code of Charles Albert, of the kingdom of Sardinia, published in 1837, was to a very great extent a following of the Code Napoleon of the French, but in the matter of ownership of running waters, and water-courses, the preceding laws of the Lombardian kingdom are confirmed by Art. 420, as follows:

"The * * * rivers and torrents * * * and generally all those portions of the territory of the state which cannot become private property, are considered as dependencies of the royal domain."

The alienation or grant of such property as is specified in this article is subject to special rules. These rules were practically the same as others which preceded them, and made necessary the acquirement of special permits or concessions from government before water might be diverted from the streams for any purpose, except under the old established rights.

Of the principle here involved M. Giovanetti says: "We, in Northern Italy have been judicious in ranking among the things appertaining to the royal or public domain, the waters of all rivers and streams, whether navigable or non-navigable. In this respect Art. 420 of our (the Sardinian) civil code is the reverse of Art.

538 of the Code Napoleon, which regards navigable rivers only as those belonging exclusively to the state."

The Kingdom of Italy.—After all Italy had been brought under one government, in 1865, was promulgated the civil code of Victor Emmanuel, of which Art. 427 is as follows:

"The national roads, the shore of the sea, the harbors, bays, coasts, rivers and torrents, the gates, the walls, the ditches, the bastions of forts and fortifications, form part of the public domain."

This provision of the code of 1865 is the law of Italy to this day, and under it all running waters, except those of very small streams, indeed, are claimed as the property of the government representing the people as a nation, and they are administered very much as are the waters of the navigable streams of the public domain of France.

Navigability, or only floatability for timber even, would not be a safe test for streams of great economical and public importance in Northern Italy, for the river beds are of such excessive slope and roughness, even where the volume of water is considerable and used by means of great works for irrigation, that navigation would be out of the question, except at very great expense for works of improvement. Although the rivers have been improved for navigation to some extent, works of this class have not been nearly so extensively prosecuted as in France; so that the streams at the heads of irrigation canals, although larger in point of volume of water than are the irrigation rivers of France generally, are frequently not navigated or even used regularly for the floating of timber.

We see, from these physical circumstances, an apparent underlying reason for the different definition of the public streams in Italy from that adopted in France. Navigability itself was a ruling consideration in France, while volume of water for irrigation was the point of importance which made the stream one of public utility in Northern Italy.

The codes of Charles Albert and of Victor Emmanuel say that "rivers and torrents" are dependencies on the public domain. As a matter of fact, in Northern Italy every stream of perennial volume, other than very small streamlets, is regarded as a river (*fiume*); and every stream of intermittent flow from the rainfall or melting of snows, except the smallest, is regarded as a torrent

(*torrenté*). Thus, it is only streams and ravines quite insignificant in size that are ranked as other than part of the public domain, and these are, because the government has not chosen to extend the application of the words "river" and "torrent" to them to meet, in their cases, the requirements of the law.

Governmental Control of Water-Courses.

Under this heading will be given without further comment or remark, for the present, a number of extracts from various acts, laws, etc., showing the extent and nature of the control and management of water-courses which the recent governments of Piedmont and of Lombardy, and the present one of all Italy, have established or continued in force.

Regulations in Piedmont.

The first abstract is that of the *General Regulations for Water-Courses in Piedmont*, which were promulgated in 1817, and remained in force for some years at least, after the unification of the government of Italy; indeed, if changed at all it is but quite recently.

And the second abstract containing some articles of the Sardinian penal code, applicable in Piedmont, and providing for the punishment of those who offend against government regulations and the laws respecting water-courses, and irrigation and drainage works.

(*1*) *General Regulations for Water-Courses in Piedmont.*

"All proprietors, possessors, or employers of canals, supplied by rivers and torrents, are forbidden to execute any works in the beds of the latter without the sanction of the authorities, under penalty of a fine not less than 10, and not greater than 100 *lire* (from about $2 to $20), in addition to the expense of replacing things in their original state, and of compensation for any damages which may have been caused to other parties.

"Proprietors, possessors, or employers of canals obtaining their supplies by means of fixed dams, are bound to maintain the positions and forms of these unaltered, to avoid raising their sills, or extending them farther across the beds of the rivers.

"When the supplies are obtained by means of temporary dams, made so as to be easily removed in times of flood, it is forbidden to render such works permanent, or to reconstruct them with heights or in positions different to those previously in use.

"It is forbidden to proprietors, etc., of canals supplied either by

permanent or temporary dams, to make any excavations in the beds of the rivers, whereby the supply would be unfairly augmented.

"Parties violating the foregoing provisions shall be bound to restore things to their former state, and shall, in addition, be subject to a fine not less than 100, or greater than 300 lire (from $20 to $60) for each offense.

"When changes in the condition of the streams may render alterations of dams or additional channels of supply necessary, the sanction of the superior authorities must be applied for. In such cases the claimant must lay before the intendant of his province a regular plan of the proposed works, prepared by a hydraulic engineer, and showing the part of the river and adjacent lands which will be affected by them, as also the different levels of the same.

"The intendant must visit the spot, or ascertain, through the agency of the government engineer of the province, that no injury to any one will result from the executions of the proposed works. All parties in the same, or in other provinces or districts, whose interests may be affected by the works, are to be heard for or against them, as may be.

"When, from unforeseen causes, want of water may arise, the proprietors, etc., of canals are authorized, in the event of urgency, to take measures to obviate the same, reporting their proceedings to the intendant of the province, who will cause the works to be inspected; and if they are found to be irregularly constructed, or likely to cause injury to others, will have them removed or altered as may be expedient.

"When changes in the course of the streams render works necessary, the matter shall be referred to the agency-general of finance; and the intendant-general, having obtained the opinion of the permanent commission (of engineers), will order the necessary proceedings.

"The proprietors, etc., of canals are bound to maintain all the works in an efficient state, and are personally responsible for any damages to others arising from their neglect.

"They are also bound to provide for the free escape of surplus water in time of flood, under penalty of a fine varying from 10 to 100 lire, in addition to giving compensation for damages.

"Siphons for the passage of waters belonging to private parties beneath the beds of streams, shall be maintained unaltered by their proprietors; and they are forbidden to execute any works connected with them, which might contract the sections or raise the beds of the rivers, under pain of a fine not less than 30 or greater than 150 lire, in addition to the expense of restoring things to their original state.

"Other articles prescribe conditions to proprietors of siphons under streams, binding them to permit these to be altered, as the government engineer may consider necessary, with reference to the protection of the public rivers."—[Smith, Vol. II, pp. 304–307.

(2) *Provisions of the Sardinian Penal Code—Applicable to Water-Courses, etc., in Piedmont.*

"Article 711. Whoever shall have voluntarily destroyed, cut, or broken through the dikes or embankments constructed for defense against the rivers, streams, or torrents, and shall have caused thereby an inundation in which one person has perished, shall be punished by death. If, however, this person has perished under circumstances which the offender could not possibly foresee, the punishment shall be that of hard labor for life.

"In every other case, the punishment shall be forced labor for certain periods, or, in lieu thereof, solitary confinement for seven years at least.

"Article 712. If the destruction or rupture of the dikes and embankments, or like works alluded to above, shall be attributable to a simple fault, the punishment shall be that of imprisonment.

"Article 713. As regards other breaches or injuries done or caused to dikes, embankments, bridges, hydraulic buildings, or other works of art, including such as belong to private parties, the punishment shall be that of solitary confinement. The tribunals may, however, in consideration of the circumstances and the nature of the injuries, substitute for the preceding, simple imprisonment.

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"Article 718. Every individual who, without right or by means other than those above indicated, shall voluntarily cause waste, damage, or deterioration on the lands of others, whether by leveling or filling up ditches or canals, shall be subject to the penalties specified below:

"If the damage done shall exceed the value of 100 *lire* (about $20), the punishment shall be three months' imprisonment at least.

"If it does not exceed this value, the punishment shall also be imprisonment, of which the period may be extended to six months.

"In the two cases referred to above, the tribunals may add to the imprisonment a fine, which shall in no case be less than one half, or greater than twice the amount of damage done.

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"Article 723. He who, without title, and without right, shall take water, or cause it to be taken from any reservoir, or from rivers, streams, torrents, rivulets, springs, canals, or water-courses, and shall appropriate it to any use whatever;

"He who, to the same end, shall break, or cause to be broken, the dikes, dams, sluices, or other like works, existing along the rivers, streams, torrents, rivulets, springs, canals, or water-courses;

"He who shall hinder, in any way, the exercise of rights which other parties may have acquired to the said waters;

"Finally, he who shall usurp any right whatever on the sources of water referred to above, or shall trouble any one in the enjoyment of the legitimate possession he may have acquired;

"Shall be punished by imprisonment, the period of which may extend one year; and by fine, the amount of which may be carried to 500 *lire* (nearly $100). The tribunals have the power of inflicting separately one or other of these punishments.

"Article 724. If individuals possessing a right to obtain or use water, fraudulently cause their outlets, dams, or channels, to be constructed in forms different to those agreed upon, or having capacities of supply greater than those to which they have right, they shall be punished as guilty of abstraction of water.

"Article 725. The proprietors, farmers, or other employers, who, in using their legitimately acquired rights to water, shall cause it to overflow the roads or lands belonging to others, shall be punished by a fine, which shall not exceed one fourth of the amount of the damage done.

"Article 726. If the crimes contemplated in the present chapter shall be committed by the guardians of woods and waters, or by any other public agents, whose duty it is to check or prevent them, the punishment of imprisonment, when inflicted, shall exceed by one month, at least, and at most by one third of its duration, the heaviest penalty inflicted on individuals not public agents, who may have been guilty of the same crime, provided always that the maximum of punishment fixed for the said crime shall not be exceeded."

Regulations in Lombardy.

The following abstracts are of regulations provided over a century ago for rivers and districts in Lombardy, and which were in force until quite recently, if, indeed, they are not so at the present time, with the addition, only, of a more complete administrative establishment for their enforcement.

These are regulations specially applicable to the river Lambro, the one dated in 1756 and the other in 1782, and both of them being republished under government direction in 1832:

(*1*) *Special Regulation for the River Lambro.* (*1756.*)

"The numerous disorders which exist along the entire course of the river Lambro, from its origin in the Lakes of Alserio and Pusiano, to its junction with the Po, having attracted the attention of the magistracy of the state of Milan, in consequence of the inconveniences and injuries at once to the royal treasury, and to public and private interests, which they have caused, most especially in the deficiency of water so frequently occurring, and traceable to them, and particularly as affecting the supply of the canal Martesana:

"The said magistracy, with the view of remedying such inconveniencies, has judged it expedient, leaving in full force all former proclamations, especially such as affect the royalties of the waters, to publish the present edict.

"Whereby, in the first place, it is forbidden to every person, of every grade or condition, without exception, to divert the water of the river Lambro from its proper course. No one shall employ it for the irrigation of arable land or meadows, without the appropriate permission and license by privilege or royal grant, under a penalty of three hundred crowns, of which two thirds shall belong to the royal treasury, and the remaining third to the guards of the river appointed for its protection, whose testimony, with that of one credible witness, shall be sufficient to warrant proceedings against offenders.

"All parties enjoying the use of water from the Lambro are warned against taking more than is secured to them by their respective rights, privileges, and grants, on pain of being proceeded against, not only for damages to the extent of the value of the water improperly taken in time past, but to entire deprivation of the water, and other penalties described in this edict; their outlets shall be closed, and the evidence of the guards, or any other parties reporting the offense, supported by a single witness, shall be deemed sufficient for conviction.

"It is forbidden to millers, or other parties possessing mills on the river Lambro, to retain or check the water in any way or under any pretext whatsoever. When the mills are not at work, the escapes shall be left open during the entire period of stoppage. Such mills as do not possess proper escapes, shall be provided with the same within eight days after the publication of the present edict, so that the water may flow freely into the bed of the river. These provisions shall be observed, under a penalty of one hundred crowns, to be applied as above described.

"Whoever, possessing the right to establish outlets or channels for the extraction of water from the Lambro, may have allowed the same to have become broken or out of repair, shall be bound to place them in good condition within one month after the publication of this edict, under the appropriate license of the magistracy, who will determine, according to the circumstances of each case, whether an inspection by the engineer or other official of the tribunal be necessary, or simply the assistance of the guard. If the repairs are not executed within the time specified, they shall be immediately afterwards effected under the orders of the magistracy, and at the expense of the recusants.

"It is forbidden to establish dams, or to construct works of any kind whatever, either across the beds or along the banks of the river, without the especial permission of the magistracy, under a penalty of two hundred crowns for each offense. The water shall be allowed to flow freely for the benefit of irrigators at lower levels,

and particularly for the increase of the supply in the canal Martesana.

"All parties using the water of the Lambro are enjoined to obey the orders of the guards appointed to watch over the execution of the present edict, under a penalty of one hundred crowns, which will be increased at the will of the magistracy.

"Two guardians are appointed for the river, one having charge from the source, near the lakes Alserio and Pusiano, throughout the entire district of Crescenzago, and the other from this latter point to the junction of the Lambro with the Po. They are enjoined to watch carefully over the execution of the present and all preëxisting regulations, to secure for the river all the water that of right appertains to it, and to report all infractions of the orders of the magistracy, on pain of removal, and such other punishment as may appear due.

"No one shall be permitted to persevere in present or past abuses, on the plea of neglect, tolerance, or carelessness of the public agents. No such plea shall be accepted from any one in mitigation of punishment for breach of these orders; and the magistracy reserves to itself the power of taking whatever steps may seem to it best in each case, saving always such rights as may be vested in the royal treasury.

"This notification shall be published, not only in this city of Milan, but in the towns of Monza and Melegnano, and in the adjoining districts."—[Smith, Vol. II, pp. 187–190.

(*2*) *Special Regulations for the River Lambro.* (*1782.*)

"Retaining in full force all preëxisting regulations, and especially that under date the twenty-sixth July, 1756, the guard of the Lambro residing at Monza is enjoined to visit annually before the twenty-fifth of March, the springs, commonly called *teste* (the heads), by which the river is fed, with the view of ascertaining that all these are well cleared, and that they really supply the entire quantity of water which could be obtained from them. All parties interested in such supply should depute persons to accompany the *camparo* during the said visits, to concert and arrange with him regarding the nature and extent of the necessary clearances, or of such other works as may be required for the efficiency of the heads. The guard should report the whole of these proceedings for the information of the magistracy.

"Having satisfied themselves of the correctness of this report, the magistracy shall order the execution of the repairs, the expense of which shall be recovered from the employers of the waters in proportion to their respective interests in the same. In addition to these expenses for works, a fair remuneration shall be fixed, at the discretion of the magistracy, for the assistance given by the guard.

"It is forbidden for the future to throw earth or rubbish, or other

matter into the river, or to extract sand, except from collections of deposit; and in removing these, care shall be taken not to derange the natural level of the river. Excavations or ditches for the collection of sand or gravel are absolutely prohibited.

"If a necessity should arise for clearing earthy materials from the bed of the stream, parties desirous of doing so should communicate with the guard, who will satisfy himself that the work contemplated can cause no damage, either to the river itself, or to the adjoining properties. In the event of new work being undertaken, reference should be made to the magistracy, who will prescribe such conditions as may appear most appropriate in each case.

"Various sinuosities of the Lambro being caused by trees falling into the bed, or by spurs which throw the force of the stream on the opposite bank, to the injury of proprietors of land there, from the erosion which is the consequence, the guard ought to immediately intimate to the owners of such tree or spurs that they must remove them within three days, otherwise they shall be removed by the guard himself, and all expenses for work or damage shall be at the charge of the proprietors.

"The trunks and roots of trees which come down the river in time of flood shall be removed by the guard; and as it is impossible to know whose property they are, they shall be granted to him as a reward for his exertions in removing them.

"The soaking of flax in the river being injurious to the fish, it is absolutely prohibited; but parties may carry on the process, each in their own channels, and the guard should at once report any infraction of this order to the magistracy.

"To prevent any affectation of ignorance, his royal highness orders this edict to be posted in all public places along the river, and enjoins all parties to obey the agents of the magistracy."—[Smith, Vol. II, pp. 190–192.

SECTION II.

Ownership and Control of Springs.

Character and Importance of Springs.

The northern plain of the valley of the Po, throughout the very localities where the principal canals have brought their waters, is the site of a great number of *fontanili*, or springs, which afford a large and highly prized supply of water for irrigation. Under extended areas of this plain, at depths from five to ten or more feet from the surface, lie beds of permeable gravel and sand filled with water, which the considerable transverse fall of the country

puts under a slight head of pressure at localities towards the middle and lower parts of the sloping surface.

Doubtless many of these *fontanili* formerly were natural springs or little marshes producing water, like the *cienegas* of Los Angeles and San Bernardino counties in our state, and have been developed and concentrated in their flow by artificial openings; but very many more, and their numbers mount up into the thousands, are purely artificial developments. They are made by digging into the permeable strata, and the waters, rising several feet, are brought out to the surface and on to the meadows further down the plain, by conducting them in ditches or closed conduits on grade slopes less than those of the country.

Besides these peculiar springs of the plains, which play so important a part in their irrigation, the country generally is one well supplied with subterranean waters, so that ordinary springs are plentiful upon the higher lands and in the hilly and mountainous districts, as in almost any similar region. Under these circumstances we might expect to find the recorded customs and laws of the countries replete with provisions touching the ownership and use of spring waters, and such is the fact, for there are treatises of considerable length and intricacy on this subject alone.

Right of Property in and Acquired Rights to Use Springs and Spring Waters.[1]

Lombardy.—The principle that ownership of land carries with it all beneath its surface and all it produces, has prevailed from the times of the earliest recorded laws in all these north-of-Italy states. Waters rising out of the soil have always been regarded as the absolute property of the owner of the soil, so long as he retained them within the bounds of his estate, and did not permit his title to suffer infringement by allowing some other proprietor to acquire a prescriptive right to their use.

The springs of the Milanese alone, in upper Lombardy, number upwards of seven hundred, and are frequently very valuable. Baird Smith tells of one, not an exceptional case at all, whose rising-pool covered a space two hundred by one hundred feet in area, and which, supplying twelve cubic feet of water per second, was estimated to be worth $20,000. These springs always remain the property of the owner of the soil, although the right to use

[1] De Buffon, Vol. II, pp. 193–198; Smith, Vol. I, sundry places, and Vol. II, pp. 167–169, 254–257, and elsewhere.

their waters may be wholly alienated and held by the owner of some other property, either by sale or prescription. Baird Smith cites the following case:

"The irrigating water on this property was derived from a beautiful spring, which may be quoted as an illustration of the strange way in which the rights of property to water have established themselves in this country. The proprietor could not tell me how or when the right of use was established in his family. No written record of any kind existed to prove it; but from time immemorial the use of the spring, though situated in the middle of another estate, belonged to the possessors of the land he held, and efforts made before the tribunals to invalidate his claim had entirely failed. He had, however, a right only to the water; to a passage for it and for his work-people along its banks; to sufficient space on each side of the channel for depositing the sand or gravel clearance; while the soil, trees, and produce of the banks belonged entirely to the proprietors of the farm on which the spring was situated."

Piedmont.—The Sardinian code of 1837 had the following provisions with respect to the ownership and control of springs, and the acquirement or loss of right to the use of spring waters:

"Article 555. He who has a spring on his land may use it at his pleasure, saving the right which the proprietor of a lower estate may have acquired by title or prescription.

"Article 556. The prescription in this case can be acquired only by an uninterrupted enjoyment during the space of thirty years, calculating from the moment when the proprietor of the lower land made and finished on the upper land visible works, designed, and which have actually served to facilitate the descent to, and the passage of the waters through, his own property.

"Article 557. The owner of a spring may not change its course when the water necessary to the inhabitants of a commune, village, or hamlet, is obtained from it, but if the inhabitants have neither acquired nor prescribed rights to the water, the proprietor may demand an indemnity, which is regulated by the tribunals, on the report of professional men."

Remembering that this code was promulgated in 1837, about thirty-three years after the publication of the Code Napoleon, and that it was a codification from laws and decrees, some of them made and put forth for the country by Napoleon during the period of his domination of it, we readily appreciate the similarity of these provisions to articles 641, 642, and 643 of the French code. [See appendix I.] They are, indeed, in the original languages, worded, as near as can be, exactly alike, with the important

exception noticed in the second couplet—articles 556 and 642. Taking advantage of the experience gained from the contests in France, occasioned by the uncertainty as to the location of the works which a proprietor must construct to facilitate the flow on to his estate, in establishing a prescriptive right to the use of spring waters, the framers of the Sardinian code evidently followed the decisions of the French courts noticed in chapter V, and which at that time had been full enough for guidance, and embodied in their code itself the explanatory provision whose absence from the French code had occasioned so much trouble in France. They distinctly said that the works necessary in the establishment of the prescriptive right must be "visible works," and "*on the upper land*"—that is, the land where the water rises, and where it is owned—and that they must be maintained for thirty years. It is said that this provision has prevented a repetition in Lombardy of the long contests which troubled the French courts on this point.

The Kingdom of Italy.—The code of Victor Emmanuel (see appendix II), promulgated in 1865, for all Italy, and now the law of the country, presents in articles 540, 541, and 542, provisions corresponding to those of articles 555, 556, and 557 of the Sardinian code above quoted. Article 540 of the new is identical in wording, in the Italian, with article 555 of the old code: the principle as to ownership of a spring is the same for all Italy as it was for Piedmont and other parts of the Sardinian kingdom. Article 541 of the new differs in general wording from article 566 of the old code, as indicated by the translations given, and also contains the important addition to the effect that the works shall not only be "visible" and "on the upper estate," but shall be *permanent*, in order to constitute conditions to establish a right of use of the waters of a spring. Otherwise, the articles are substantially the same. Article 542 of the new is differently worded, but has substantially the same meaning as article 557 of the old code, with the exception that the character of evidence required in the adjudication of damages, is left to other general provisions of law, and not specified for this case in the new code.

Regulation of the Opening and Use of Springs.[1]

Not only, from the earliest recorded custom touching this subject, has the ownership of ground-waters in Italy vested exclu-

[1] Authorities, same as last referred to, and also as cited below.

sively and completely in the owner of the land, but within certain prescribed regulations as to distances from other works, every owner of lands might dig for water as he chose, and do with water so found as he saw fit. The origin of these springs, scattered by thousands over the plain, being in a common water-bearing stratum, which was cut through by the natural, as well as cut into by the artificial surface drainage and supply channels—the rivers, creeks, and large canals—it was found at an early period in the development of the country that the opening of new springs drained the waters from old ones, as well as from the water-courses, when excavated too near thereto.

Amongst the earliest of the statutes of Milan was one prohibiting the opening of a new spring on any property within a certain distance from the bank of any river, or within a certain other distance of any other spring already formed, under pain of a heavy fine to be forfeited to the treasury of Milan, and with the obligation to refill the excavation and extinguish the new spring. Later legislation discontinued the prescribing of any fixed distance to be maintained between springs, but provided for leaving that point to experts to decide for each case according to circumstances.

Lombardy.—The important parts of the legislation of Lombardy, regulating the opening of new water-courses, in force from the early part of this century to the consolidation of the kingdom of Italy, about twenty years ago, were contained in the law of 1804 and a decree of 1806. The item in point, of the law referred to, was as follows:

"Article 55. It is forbidden to excavate or open springs, or heads of springs, water-courses, and channels, as also to deepen or increase the dimensions of excavations, or springs actually existing, in the vicinity of rivers or canals, within the distances which, according to the judgment of professional men, could lead to injury to the rivers or canals, or to their banks."

This law was one placing the running waters—rivers, streams, and torrents—under the charge of the public administration, and providing regulations to be observed in carrying out the charge. It did not relate, in any way, to springs and waters not of the public domain, except as might be necessary to protect the public waters. Hence we find that its provision concerning the distances to be observed in opening new springs, and making excavations which might cause the opening of springs, related to the "vicinity

of the rivers and canals," only. The decree of 1806 supplemented the above provision of the law, by the following paragraph, in article 12 of title 2:

"Saving the prohibition in article 55 of the law of 1804" [above quoted], "it is permitted to every one to excavate springs on his own land, and to conduct the waters, respect being always had to any rights which other parties may possess."

It has been held that this provision of the decree of 1806 applied the rule of the law of 1804 to all excavations on private lands, regulating their distances from other springs, canals, etc., of private parties, as these had previously been regulated with respect to the location of public canals and rivers. These rules were the result of a summarizing of the outcome of experiences wherein it was found that circumstances of soil, subsoil, and practice produced such great differences in the minimum distances to be maintained between new and old excavations and channels—these varying from 8 to 200 yards—that it worked hardship to establish any fixed distance, and equity could only be arrived at by a general provision of law, leaving its application to expert judges of the facts and natural laws in each case. De Buffon says, with reference to the laws of 1804 and 1806:

"By this ruling, as may be seen, the legislator was compelled to adhere to the principle of leaving it entirely to the option of experts to fix the distances of new excavations from older established works, in the different localities, so as to cause no injury, without prescribing a minimum determined distance, as has been done in the case of the Piedmontese law. The fact is, that it has been very difficult to fix this minimum for a territory like the Milanese, where, in most any locality, one is sure to find water by excavating, and never knows but that it is water which has percolated from some of the numberless canals which exist in the neighborhood."—[De Buffon, Vol. II, p. 228.

Piedmont.—The early legislation of Piedmont on this subject was crystallized in articles 599, 600, and 602 of the Sardinian code in 1837, and in this form continued in force until the consolidation of the Italian kingdom in 1865. These articles take the form of, first, prescribing rules for excavations, such as ditches, canals, etc., not designed for the purpose of opening new springs, and, then, applying these rules, with additions, to the case of excavations made expressly for the purpose of getting a new flow of water. The articles concerning excavations for ditches will be given in a subsequent chapter of this paper. I state their main features

here, and then give the article specially relating to excavations for springs.

In excavating upon one's own land, for a canal, ditch, or other similar purpose, the upper edge of the excavation had to be placed at a distance at least equal to its depth from the nearest boundary of the property of another; the face of the excavation had to be sloped away at a rate not steeper than one on one, and if local custom or regulations prescribed a greater distance or longer slope, then such custom or regulations had to be followed. And, furthermore, should the boundary of the estate be formed by a ditch or road owned in common, the excavation had to be at the distance mentioned, from the nearest edge of such ditch or road. These provisions are found in substance in articles 599 and 600; article 601 relates to the case where the line of boundary is formed by a party wall, or wall owned in common, and then comes the special provision concerning springs, as follows:

"Article 602. Parties desirous of opening springs, of establishing heads or channels of discharge for the same, of making canals or water-courses, of clearing, deepening, or widening the beds, of increasing or diminishing the slopes, or varying the forms, shall be bound to observe such increased distances over and above that fixed in the preceding articles, and to execute such other works, as may be considered necessary for the protection of preëxisting springs, canals, or water-courses, designed either for the irrigation of land or the supply of buildings.

"And in case of dispute between proprietors, the courts in deciding ought to aim at reconciling the respective interests of the parties in the manner most just and equitable, having due regard to the rights of property, to the advantage of agriculture, and to the special uses to which the water may be destined. And, further, in all cases where such proceedings may be necessary, they ought to determine and decree, in favor of one or the other party as may be right, that amount of compensation which may appear on grounds of justice and equity to be fairly due."

The Kingdom of Italy.—In the Italian code of 1865 the provisions above referred to and quoted from the Sardinian, were closely followed in tenor, so that it is only necessary to refer to articles 575, 576, and 578 to note the concurrence. [See, appendix II.]

The Question of Distance, one for Experting.

The ancient legislation of Milan prohibited the opening of new canals or spring heads within 66 feet of rivers, and 580 feet of

preëxisting springs; that of Verona fixed the last distance at 639 feet; of Brescia at 106 feet; while the old laws of Mantua prescribed 24 feet as the minimum between new and old water-carrying or producing excavations of any kind; thus, illustrating the fact that, in different quarters, soils of very different degrees of permeability were found, and showing the necessity for leaving questions depending upon varying physical phenomena, to be determined as they arise rather than by any general rule of law; and explaining why the modern legislation of the country has provided for a proper official experting of such cases and a decision of them on the facts and the deductions properly due thereto. The necessity for supervision of this kind is well presented by the following extract from the work of an Italian author, worthy of all attention on these subjects. He says:

"Agriculturists find it hard that they can scarcely strike a spade into their lands without running the risk of being summoned before the courts, and forced to give security against possible damages. The proprietors of springs and canals are wearied to death by having to remain always on the watch against the works undertaken by their neighbors, or of having to submit even to real injury from the difficulty of obtaining clear evidence of it."—[Smith, Vol. II, p. 249; quoting Giovanetti.

SECTION III.

The Riparian Right.[1]

Bearing in mind the fact of the definition of public streams as being "rivers" and "torrents," and that these words apply in fact to all water-courses except very small streamlets and minor ravines, we may now go on to the consideration of the riparian water privilege accorded by the codes of Charles Albert (1837) and of Victor Emmanuel (1865).

Piedmont.—The Sardinian code (1837) contains the following provision:

"Article 558. Any one whose land borders on a stream flowing naturally, and without the aid of works executed by man, and which has not been included among the rivers, streams, and tor-

[1] See the Sardinian and the Italian Civil Codes; also, De Buffon, Vol. II, Chap. 45, Sec. 1, and elsewhere; and Smith, as cited.

rents, declared in article 420 to be the property of the royal domain, may make use of it during its passage, for the irrigation of his property.

"Any one whose property is intersected by such a stream may make use of it within the limits of his own land, with the obligation, however, of restoring the water to its natural channel on its passing beyond the boundary of his estate.

"Article 559. In the event of any dispute arising between the proprietors to whom such waters could be useful, the tribunals, in deciding, must conciliate the interests of agriculture, with, at the same time, a due regard to the right of property. And in all cases the local and special rules which regulate the course and use of the waters must be observed."

From this we see that the owner of one bank of a natural stream not considered of public importance, might make use of its waters in irrigating his riparian lands; and that the owner of both banks might also utilize it upon his estate, but that he had to return the waters to the natural channel.

This was a close following of the Code Napoleon, after which the Sardinian code was framed, and left open the question as to whether or not the owner of one bank had to return the water to its natural channel after use in irrigation, and if so, how much or what proportion he had to return. This, as we have seen was a great question in France, which was, after long litigation, set at rest by decisions of the highest courts and rulings of the administration, declaring that the obligation to return the water to its natural channel applied only in the case of diversion for other uses than irrigation.[1]

The Kingdom of Italy.—In framing the Italian code in 1865, this ambiguity was done away with, somewhat, by the following wording:

"Article 543. Whoever has an estate bordering on a stream which flows naturally and without artificial help, excepting such as are declared public property by article 427, or over which others have a right, may make use of it for the irrigation of his lands, or for the exercise of his industries, on condition, however, that he restores the drainage and residue of it to the ordinary channel. Whoever has an estate crossed by such a stream may also use it in the interval of its transit, but with the obligation of restoring the drainage and residue of it to its natural course when it leaves his lands.

"Article 544. Should a dispute arise between owners to whom

[1] Refer to pp. 107 and 108, *ante*, and elsewhere. Remember that this applies to streams *not* of the public domain: In France, to streams not floatable for logs, even; and in Italy, those not of consequence as irrigation feeders.

the water may be of use, the judicial authority must reconcile the interests of agriculture and industry with the rights of property; and in all cases the particular and local rules applicable to the stream, or the use of the water, must be observed."

As the law now stands in all Italy, therefore, the owner of one or both banks of such a little stream may use its waters in irrigating his riparian lands, but he must restore "the *drainage and residue* of it" to the ordinary channel; while he who is not a riparian proprietor cannot take such waters at all without the consent of all of the bank-land owners, nor can any riparian proprietor assign his right to water from such a stream to any one else. The riparian right to divert waters from a stream is confined to the case of very small streams, and is scarcely known in the Valley of the Po—certainly not on any of the streams which rank as important sources for irrigation supply. On this subject Mr. Baird Smith has written as follows:

"Even the riparian proprietor is prohibited from using the stream which flows past or intersects his land, without the special permission of the government, both in Northern India and Northern Italy." * * * But "there are instances in both regions where, perhaps in remote places, in mountain valleys, or like localities, the running streams have been used for ages by the inhabitants without let or hindrance, or acknowledgment of superiority of any kind. * * * The framers of the Albertine Code,[1] wisely respecting rights founded in immemorial usage, include all such rights in articles 558 and 559, which seem to be most judiciously adapted to the peculiar circumstances under which these exceptions to a general rule have arisen."—[Smith, Vol. II, p. 256.

AUTHORITIES FOR CHAPTER IX.

Sismondi.—"History of the Italian Republics." By J. C. R. De Sismondi; 1 vol.; London, 1832.

Hallam.—"History of Europe during the Middle Ages." By Henry Hallam; vol.; New York edition, 1853. See, Chapter III, "Italy."

De Buffon.—"Agricultural Hydraulics: Of the Canals of Irrigation of Northern Italy." By Nadault De Buffon, an engineer-in-chief of the Government Corps of Civil Engineers, France; 2 vols. (French); Paris, 1862. See, Vol. II, Chapters XXXVIII to XLVI.

[*Note.*—Although by the same author, this is a different work from that cited for Chapter II, and others succeeding, concerning French legislation, etc.]

Smith.—"Italian Irrigation: A report on the agricultural canals of Piedmont and Lombardy." By R. Baird Smith, captain of engineers, Begal Presidency; 2 vols.; London, 1855. See, Vol. II, Part IV, Historical Summary; Chapter I, Sec. 1, and Chapter II, Sec. 1; and elsewhere, as cited.

Sardinian Civil Code.—[See, authorities for Chapter X.]

Italian Civil Code.—[See, authorities for Chapter X.]

[1] The Sardinian code was promulgated by Charles Albert; and hence called "Albertine."

CHAPTER X.—ITALY[2];

WATER PRIVILEGES AND CANAL WORKS, AND THE ADMINISTRATION OF WATERS AND WORKS.

SECTION I.—*The Right to Construct Works in and to Divert Waters from Streams.*
Governmental Policy in regard to Water Privileges.
Applications and Formalities for Water Privileges.
Terms of Water-Right Concessions.
The new Italian Law on Water-Rights.

SECTION II.—*Administrative Regulation of Water-Courses.*
The Administration.
River Regulations.
Construction of River Works.
Policing of Public Waters.

SECTION III.—*Administration of Government Canals.*
The Administrative Bureau.
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SECTION I.

The Right to Construct Works in and Divert Waters from Streams.

Governmental Policy in regard to Water Privileges.

During the times of the ownership of the streams and waters by the sovereigns of the states, and by the petty feudal rulers, and by the sovereign powers of the states as the representatives of all the people, in each case, as has been spoken of under preceding headlines, the right to divert water from any river or torrent could only be acquired in the states of northern Italy by special grant or concession of privilege made on a formal application, after due examination and consideration of all the interests to be affected, and all the circumstances likely to affect the interest acquired under such grant. And now that the country is united under one government and the waters belong to the royal or public domain,

the same rule and substantially the same formalities in applying it exist.

Milan.—The earliest recorded laws of any of the northern Italian states—the Milanese code of 1216—contained an express prohibition of the act of building a dam or other structure in the channel or bed of a stream without due authority, and prescribed a process necessary to be gone through with in obtaining such authority. This principle of active governmental control and administration of the streams is found in all the compilations of laws which follow, for the region of the former republic of Milan.

Venice.—During the fifteenth century the republic of Venice promulgated anew throughout its irrigation provinces, regulations as to diversion of water from streams, similar in principle to the laws of Milan. Those thus published for the province of Verona commence with this declaration:

"Every inhabitant of the territory of Verona is at liberty to derive, from the rivers appertaining to the state, such supply of water as is necessary for the irrigation of his property, on obtaining the requisite authority from competent magistrates, and under the condition that he inflicts no injury on parties possessing older rights to the same waters."—[De Buffon, Vol. II, p. 297.

Having said thus much for two of the ancient governments, we come now to those of modern times in these regions.

Lombardy.—It appears that the policy of the rulers in Lombardy until the later years of its existence as a separate state, has generally been to dispose of the waters of its streams in absolute property, by gift or sale, to those who constructed the canals to lead them out, or itself to lead them out in canals and sell them directly or indirectly through "farmers of the canal revenues," to the irrigators. One notable exception to this rule was during the first domination of the Austrian government over the Lombardo-Venetian provinces; at which time a regulation for the administration of matters pertaining to water-courses was issued, which contained this clause:

"In making grants we do not thereby vest in the grantee the right of property in the water, but only the right to use it either in irrigation or for hydraulic works. The right of property shall remain as heretofore among the rights appertaining to the crown."—[Smith, Vol. II, p. 212.

But this was only a short-lived exception to the ruling policy which prevailed for centuries in this region; so that at the period of the consolidation of the Lombardian kingdom, such a great number of rights to water had grown up and called for recognition, that the waters left at the disposal of the state were reduced to a comparatively small quantity. After the formation of the more modern kingdom:

"In exercising its right of property in these waters for irrigation, the government of Lombardy followed one of three courses: 1st. It disposed of the water in absolute property, to parties paying certain established sums for it. 2d. It granted perpetual leases of the water on the payment of certain sums annually. 3d. It granted temporary leases for variable times at certain annual rates, the water reverting to the state on the termination of the lease."—[Smith, Vol. II, p. 135.

The first named course in policy was most common in the earlier years of the existence of the late government; and, at that time, the last named plan was the least often resorted to. At a later period the policy of granting the water in absolute property was almost abandoned; that of granting perpetual leases became prevalent; and the third method of granting temporary leases came into favor. And these two courses were those followed by the Lombardian government at the time of the consolidation of the Italian government, and the extinction, as an independent power, of that of Lombardy.

Piedmont.—The government of Piedmont has generally been more conservative in the care of its waters than that of Lombardy. Absolute grants of ownership of waters ceased in that country long before the beginning of the present century. Water privileges for all time have indeed been issued, but the full right of regulation was reserved to the government, and the cession of propertyship in the water was expressly disclaimed. This distinct reform, however, occurred of late years as compared to the origin of many water rights in the country, and the important works have claimed absolute rights of ownership in the waters acquired in the centuries gone by. During the later years of the existence of the Piedmontese government its waters were disposed of only on long term leases, drawn up with great care and in minute detail.

The Kingdom of Italy.—This last mentioned policy is that chiefly pursued by the government of Italy since it has supplanted those of Lombardy and Piedmont; the duration and terms of concessions being, as we shall see, quite similar to those already written of for France in the chapters of this report which have gone before the present.[1]

Applications and Formalities for Water Privileges.

Piedmont.—The acquirement of water privileges in Piedmont and the operations of diversion were, for many years previous to the consolidation of the Italian government, regulated by the following royal:

Instruction to the Governors of Provinces and the Agents of the Royal Domain, with respect to Grants of Water from Rivers and Torrents, dated in 1828.

"* * * Sundry statutes and patents formerly published, have hitherto regulated the provisions for grants; but as it is desirable to establish one uniform rule of procedure in such cases, the secretary of finance, whose duty it is to obtain the royal sanction to proposed grants of water, has decided that in future the following orders shall be observed:

"I. Parties desirous of obtaining grants of water from the royal rivers and torrents, whether for irrigation or the movement of machinery of any kind, must present to the intendant of the province where the head of the proposed derivation is situated, petitions addressed to his majesty and authenticated by the signatures of the petitioners, or by those of a notary and advocate.

"II. To each petition the undermentioned documents should be attached:

"(1st.) A regular plan of the locality, on which shall be noted the works which it is proposed to construct in the bed of the river or torrent, and the adjacent ground, so far as it may be connected with these works.

"(2d.) Longitudinal and transverse sections of the river whence the supply of water is obtained, marking thereupon the depths in time of flood, and under ordinary circumstances; also, the height of the works to be established in the stream, and of the head of the ditch.

"(3d.) A detailed report, proving the utility of the proposed works, and that they cannot cause any injury, either to other parties, or to the river or torrent itself.

"These documents must be prepared by a hydraulic engineer. But in the event of no hydraulic engineer being near at hand, or

[1] Letters from Hon. George P. Marsh; also, see Law concerning the Diversion of Public Waters, August, 1884, an abstract of which is introduced as a whole at end of this section.

of the works being of limited importance, it is permitted, but with special reserve, to employ a civil architect, or a land surveyor, in the preparation of the papers above referred to.

"The intendants of provinces will render all practicable assistance to parties interested, so as to enable them to comply with the rules of the superior authorities.

"III. The petition and the documents above specified should all be prepared on stamped paper.

"IV. The intendant, on receiving the claim and its appendices, shall satisfy himself of their regularity, and shall depute the official engineer of the province to visit the spot at a specified time, to investigate the practicability of the project, and the propriety, or otherwise, of carrying it into effect; as also to decide on whatever precautions or modifications regard to public or private interests may require.

"V. The visit must be preceded by a publication of the claim, within the limits of the district specially interested in it.

"If the claim and the works proposed are in any way connected with the interests of more than one district, the notification should be made at the same time throughout the whole.

"VI. The order of the intendant should contain a brief summary of the nature and extent of the proposed works, and an invitation to all parties interested in them to be present at the time appointed for the visit, when they can explain their views, either verbally or in writing.

"VII. The report of the official engineer must, in all cases, furnish full and clear details on the following points:

"(1st.) On the quantity of water to be taken from the river and the special use to which it is to be applied.

"(2d.) On the form and dimensions of the headworks to be constructed, being careful to note that the provisions expressed in article 16 of the regulation of the twenty-ninth of May, 1817, are vigorously to be enforced.

"(3d.) On the directions, heights, lengths, forms, and mode of construction of the dams required to raise the water.

"(4th.) On the precautions to be observed by the grantee, when the supply is to be obtained by means of temporary dams, in replacing the same after the floods. Grantees being generally inexpert and careless in hydraulic operations, a matter so important as this proceeding should not be left dependent on their wills, but definite measures should be prescribed whereby the injuries likely to be caused to the beds of rivers or torrents by badly constructed dams may be guarded against.

"(5th.) On the capacity and slope of the canal for the passage of the water.

"(6th.) On the means to be adopted to insure the regular execution of the works, to restore (when such is possible) the water to the stream at a lower point, and to protect all parties from damage by overflow of the canal or otherwise.

"(7th.) And, finally, the official engineer must detail any local peculiarities which may have influenced his opinion.

"With such information before it the permanent commission of engineers (to whom the project will be referred) can better decide on the propriety of sanctioning the final execution.

"The various documents above referred to will be attached to the royal patent authorizing the grant, in order that both the administrative and the judicial authorities may always have the means of ascertaining precisely the terms of the said grant, and of restricting the grantee within the limits of the same.

"VIII. On the receipt of all the papers connected with the case, the intendant should forward the same to the agency general of finance, with his own opinion upon them.

"IX. So soon as the agency general receives notice from the secretary of finance that the royal patent for the grant has been signed, it will communicate without delay with the intendant, who will transmit the information to the official engineer, to the syndic of the district, and to the petitioner, requiring the latter to procure the aforesaid patent from the secretariat of finance, and to pass it through the offices of the agency and the chamber of accounts, within the space of four months, under pain of forfeiture.

"X. The receiver general shall be supplied with the necessary instructions to enter the patent on his list, and to arrange for the collection of the annual water rent."—[Smith, Vol. II, pp. 249–253. See, also, De Buffon, Vol. II, p. 223, *et seq.*

Lombardy.—Several regulations of a like tenor prescribed the forms of application and proceedings to be observed in obtaining water privileges in Lombardy, but their provisions are so like those of Piedmont, just transcribed, that it would be a useless repetition to give them here.

The Kingdom of Italy.—When these north-of-Italy governments were set aside in that of unified Italy, in 1865, there was passed a general law on public works, of which chapter V of title III treated of the diversion of public waters and established general regulations and formalities to be observed in applying for privileges to divert waters from rivers, torrents, streams, and other natural water-courses and bodies of water. This chapter has been superseded by a special law on the subject, passed in August, 1884, an abstract of which is introduced at the end of this section. It will be seen that articles 2, 3, 8, and 9, particularly, contain instructions for proceedings to acquire water-right privileges, and that the general terms are substantially the same as those heretofore written of and explained for France.

Terms of Water-Right Concessions.

Lombardy.—Previous to the recent consolidation of the Italian government, the general terms of water-right concessions in Lombardy were fixed in a regulation dated in 1806, and which was in this particular as follows:

Water-Right Regulations—1806.

Title I. Diversions of Water from Rivers, Torrents, and Public Canals.

"Article 1. No one can divert public waters nor employ them for mills without a concession from the government.

"Article 2. This grant specifies the quantity, the duration, the manner, and the conditions of the derivation, and the particular use of the waters, and establishes the annual rent which corresponds and is due.

"Article 3. The terms of the preceding articles are not intended to work prejudice against actual possessors in their rights and uses for the water-heads and mill-rights in which they already have just title under the terms of the laws and customs in force in the different provinces.

"Article 4. No new grant can be made to bring injury to existing rights. These will be protected, by appropriate reservations, from the influence of later concessions. To this end all petitions (for new grants) are published and posted, engineers are consulted, and together with their reports the proper conditions for the conduct of the work are inserted in the regulation.

"Article 5. It is prohibited to change, under any alleged right, the actual state of outlets and of fixed dams without the permission of the government.

"Article 6. The works made for diverting water by the aid of movable dams must be approved by the engineer-in-chief of the province, who must give notice thereof to the direction-general.

"Article 7. The engineers are charged to take care, in the public interest, not only of the use of the waters conceded for irrigation and for mills, but that the clauses and conditions imposed in the ordinances are observed.

"Article 8. To this end, they must keep in their offices a register, in which are recorded all concessions.

"Article 9. In case any one having a right to use water commits any abuse (of the right) the engineers-in-chief are authorized, by virtue of their office, to reëstablish the place in its original state and under their direction; for this power must be fully expressed in all the acts of concession.

"Article 10. When contests occur concerning the use of waters, devoted to no other object than the interest of individuals, they shall be tried, as of old, by the ordinary tribunals.

"Article 11. When, in such contests, public and private inter-

ests are both concerned, they are to be carried before the administrative authority."—[De Buffon, Vol. II, pp. 226, 227.

Piedmont.—By the terms of the Sardinian code, applying to Piedmont, grants for the use of water from streams of the royal domain were made only on condition that no injury should be brought about to legitimate rights previously acquired. In the construction of works and management of waters under such grants, the grantees were obliged to avoid backing up waters upon those holding rights above them, or precipitating waters in undue volume on those below them, or depriving others of the waters which were due them. And should any damage accrue from their acts of omission or commission, they were bound by the terms of their grant to repair the same, and further to suffer such punishment as might be provided by the local or general police regulations. In conducting their waters under such grant they were obliged to construct works according to prescribed and approved plans, to maintain those works under governmental supervision, and to observe the regulations provided for the ruling of such matters. The following are the articles referred to:

"Article 631. The grants for the use of water appertaining to the royal domain are always made on condition that they involve no prejudice to anterior and legitimately acquired rights to the same water.

"Article 632. Parties having the right to extract and divert water from rivers, streams, torrents, canals, lakes, or reservoirs, are bound to avoid injuring those situated above or below them respectively, by the stagnation or by the backing up, or by the change of course of the said water. Whoever by neglect may cause any damage in these ways, shall be bound to repair the same, and further to suffer such punishment as may be established by the regulations for the rural police."

The Kingdom of Italy.—Upon this point, articles 614 and 615 of the Italian civil code (see appendix II) contain the provisions corresponding to those above from the Sardinian code. Supplementing the code provisions on this point, and the entire subject of the present section, the legislation of Italy was made more complete by a chapter in the public works law of 1865, and this has now been supplanted by the still more ample law whose substance is next presented.

Present Law concerning Diversions of Public Waters.[1]

The Kingdom of Italy.—The policy of the present Italian government, the terms of its water-right concessions, and the formalities to be observed in applying for privileges, are fully set forth by the following very recent law, which has gone into effect only in February of the present year, taking the place of chapter V of title III of the general law on public works, passed and promulgated in 1865. An example of this line of policy and the terms of water-right concessions is given in chapter XV, succeeding, in the account of the Cavour canal enterprise.

Abstract of the Law, passed August, 1884, in effect February, 1885.

No one may divert public waters, nor establish therein mills or other factories, if he has not a legitimate title to a privilege to use the water, or has not obtained a concession from the government, which grant is subject to the payment of a rent, and to the conditions established by the present law. Thirty years undisputed possession is evidence of a sufficient title to a privilege if no contract or record of grant exists.—[Arts. 1 and 24.

Concessions are always made without prejudice to the rights of third parties. Those which are for the diversion of water in perpetuity can only be made by authority of a special law. In lakes, in beds of bordering overflow waters, in navigable water-courses, and in those of which the embankments and shore works are inscribed as hydraulic works of the second class, the concessions of water are made by royal decree, promoted by the ministry of finance, after the propositions have been previously considered by the council of the province which may be interested, and after having heard the superior council of public works, in the interest of the good régime of the water, of free navigation, and of the bordering properties. In all other public water-courses the concessions are made by the prefect upon the advice of the council of the prefecture, and after having heard the opinion of the provincial civil engineer in cases where there may be opposition. When a diversion of water may affect the territory of more than one province, the concession is made by the prefect of the province in the territory of which the point of derivation is situated. In case of opposition on the part of another interested province the contro-

[1] Laws and Regulations received from Ministry of Public Works, Italy.

versy is decided by the minister of public works, upon the advice of the superior council of public works, and the concession is made by the minister of finance.—[Arts. 1 and 2.

The act of concession describes the quantity, manner, and conditions of the diversion, conducting, using, and of the restoration of the waters, the guarantees required in the interest of agriculture, industry, commerce, and public health, and names the annual rent that is to be paid to the governmental treasury for the use of the waters. The time within which the full amount of the conceded waters have to be diverted and utilized, under pain of forfeiture, is also specified; and discretion is given a competent authority to cut short this term when it becomes justified by delays in the execution of the works. Temporary concessions are made for terms not exceeding thirty years; but at the expiration of such term the grantee has the right to obtain a renewal of his privileges for another term, and so on successively, saving the modifications which altered conditions of the locality or of the water-course may render necessary in the agreement of concession. The renewal of a concession may be denied when in the preceding term the waters have not been used, when the privilege has been abused, or when, in the judgment of the administration, the grantee has not used his privileges for the proper and specified purpose.—[Arts. 4 and 5.

A grantee of a water privilege is free to vary the use and the machinery of his manufactory if third parties be not damaged by such change, and if no change is made in the mode, works, or quantity of the diversion, nor in the place of restoration of the waters. But notice of any such change of use has previously to be given to the prefecture, on pain of a fine of triple the rate payable for the privilege, and also saving the right of the administration to compel restoration of the works and accessories to their original condition, and at the expense of the transgressors, when the alteration proves injurious to other interests. If the alteration augments the amount of water required or the motive force, the change in the concession must be made as though it were a new grant of privilege, and the rate will be fixed in proportion to the increase of water or of the power acquired.—[Arts. 6 and 7.

Applications for new privileges, accompanied by plans for the works proposed to be built for the diversion, conducting, use, and restoration of the waters, are presented to the prefecture of the province, and are thence communicated to the provincial depu-

tations interested, for their observations. Then the projects are published in the interested communities, notifying all interested parties to be present at a specified time to present their views. The provincial civil engineer goes over the ground with the applicants and other interested parties, and reports his opinion. The final conclusion must be reported within a month, but only after the opposition has been fully met by administrative methods will the concession be made.—[Art. 8.

When by reason of a change in the water-course, or for any other reason, the grantee of a concession intends to change its position, or the form or nature of the work authorized, or make additions or other works accessory and in the bed or on the banks of the water-course, or, finally, to add to or diminish the motive power or the quantity of water derived, he must make application accompanied by plans and descriptions of his project as for a new concession, and the proceedings will be the same as specified in the preceding paragraph. In a case of urgency, the prefect, after having heard the opinion of the provincial civil engineer, may, in a provisional way, permit the desired work to go on for such purpose as reëstablishing the flow of water into the canal of diversion, on condition that the grantees bind themselves to obey the final restrictions which may be imposed after the regular inquiry has been had.—[Art. 9.

All proprietors, possessors, and users of privileges to divert water from rivers and torrents are obliged to maintain the specified openings in their structures of diversion and to preserve them in good condition, and they are held responsible for any damages which may result to neighboring lands, save in case of overpowering adverse circumstances. Such proprietors, possessors, and utilizers must also, with their regulators, manage the diversions in a manner such that in times of flood excessive waters be not introduced into their respective canals, and they must do all possible with the help of neighboring laborers, at such times, to prevent damage to the stream, its banks, or embankments near their works. All persons having permanent or temporary water privileges of diversion, whether by open cuts, or structures stable or unstable, are obliged to maintain them without damage to public or private interests, following local usages, and maintaining proper flood openings; and they are obliged to do such work as may be deemed necessary by the administrative authorities, to guarantee the immunity from danger. The public administration is expected to enforce the con-

ditions and restrictions imposed in water-right grants, and to see to proper maintenance of works. If for some reason of public interest it becomes necessary to change or alter a water-course or modify the régime of a river at a point of diversion of water under a government grant, the state cannot be held responsible for damages to the grantees, and they have no recourse except that of ceasing to pay their rental for waters, or changing their works to suit the altered conditions.—[Arts. 10, 11, 12, and 13.

The payments for new privileges to divert public waters are fixed according to the following rates:

For every module of water, of 100 litres (3.53 cub. ft.) per second, for drinking or for irrigation without an obligation to restore the drainage or residue, 50 *lire* (about $2.82 per cub. ft.) per year.

For each module, etc., with the obligation to turn the drainage and residue from irrigation back into the stream, 25 *lire* per year.

For the irrigation of lands with a derivation not measured by volume, for each *ettaro* (about 2.50 acres) irrigated, 0.50 *lire* (about 4 cents per acre) per year.

For concessions of water for the betterment or reclamation of waste lands and irrigation of crops, jointly, the rates are reduced to one half of those for irrigation, and where the water is used only for reclamation of wastes the rates are but one fifth of those for irrigation.

For water used in irrigation only in winter, according to the definition contained in article 624 of the civil code, the foregoing rates for irrigation waters are reduced by one half.

For each nominal horse-power intended for motive force, 3 *lire* per year. For power for floating mills the rate is 1 *lire* per horse-power per year. The motive force by which the rate is fixed is estimated when possible by measurement of the effective fall and of the volume of water applied.

For mills and other manufactories which from scarcity of water are able to work only at intervals, the water rents are regulated according to the average amount of power available in past years. But in no case will the annual rate be less than 3 *lire* per horse-power for the full year.

For communities and works intended to distribute water to inhabitants of communities the privilege is gratuitous.

These rates are all for water privileges on public rivers, torrents, and streams, and do not apply to waters granted or sold

from canals belonging to the government.—[Arts. 14, 15, 16, 17, and 18.

Grantees of water for irrigation, upon notifying the prefecture, may use it also for motive power, provided no injury is done to other persons; but grantees of power privileges may not use their waters for irrigation without additional special permits therefor. In any case for a double use, the rate will be the higher of the two, and if the notification to the prefect is omitted the penalties of article 6 will be enforced. Violations of the provisions of this law may be punished by imprisonment and by fines to a maximum of 500 *lire*.—[Arts. 19 and 22.

The minister of public works is charged with the duty of compiling a complete schedule of public waters in each province of the kingdom; and the schedule for each province will be published therein, and interested parties will be expected to present and prove their claims within three months after publication. Thereafter the schedules will become approved by royal decree, after hearing the provincial councils of the provinces interested, the council of public works, and the council of state; and in case of final controversy questions may be carried into the courts.—[Art. 25.

The minister of public works is charged with the duty of compiling a complete schedule of diversions of public waters in each province, from the returns obtained by proceedings as follows:

All users of public waters are required to make to the prefecture of their province, within two years after the adoption of the schedule of public waters, a declaration of their claim of right, stating (1) the locality of diversion from and that of its return to the stream, (2) the use to which the water is applied, (3) the approximate quantity of water used annually, with an exhibit of the surface irrigated or of the nature and extent of the works served, (4) the history of the title or grant by which the privilege is held.

If this declaration is not made within the stipulated time of two years, the delinquent diverter of water will be fined in an amount equal to double the annual rate paid for the privilege, and a similar fine will be inflicted for each succeeding year he neglects to present his statement; and after three years the administration may suspend his use of waters altogether.—[Arts. 26 and 27.

Such is the very latest European legislation on the subject of water-rights and irrigation. It is a noteworthy coincidence that

on the very date upon which this Italian law went into effect the State Engineer of California was advocating before a committee of our last legislature the passage of a measure having the same object and embodying substantially the same principles as articles 25, 26, and 27, above epitomized. And this was without any knowledge of the Italian measure; for it will be seen on comparison that the advance sheets of this report presented to the legislature contained no mention of the Italian law. Indeed, the necessity for and general features of the proposed Californian law for "The Discovery and Adjudication of Water-right claims" were stated and outlined in the Report of the State Engineer for 1878–9, the measure was drawn out in the report of 1880, and has been urged in every succeeding report.

SECTION II.

Administrative Regulation of Water-Courses.

The Administration.[1]

The former administration of water-courses and waters in Piedmont has already been sufficiently explained in the provisions of the "Instructions to intendants of provinces," transcribed under the subhead of "Applications and Formalities," given in the first section of this chapter. The organization and system of the Lombardian government was so nearly identical with that of Piedmont in this respect, as to render unnecessary any detailed reference to it here. It now remains to glance at the present system for all Italy, which indeed was founded upon that of Piedmont.

The Kingdom of Italy.—The executive functions of the Italian government are exercised by ministers appointed by the king. Amongst these are a minister of public works, and a minister of agriculture, industry, and commerce. The powers and duties of the minister of public works were defined at length in a general law concerning public works, promulgated upon the unification of the Italian governments, in 1865. These attributes relate to national and other roads and railroads, capitalized railway projects, ports, lighthouses, public monuments, telegraphs, water-courses, waters, and canals. With respect to these latter, the

[1] Letters from Hon. George P. Marsh; General Law on Public Works, 1865.

minister is charged with "adjusting the flow and guarding of public waters, rivers, torrents, lakes, canals, and streams of artificial current, examining and adopting projects for works relating to river navigation, transportation and floatage of timber, works for the protection of the banks and beds of water-courses, the defense of adjacent lands from abrasion and inundation, works for the diversion of public waters, the betterment of damp lands, and, finally, with the technical government of navigation of rivers and lakes." He has charge of the "irrigation and navigation canals belonging to the crown, so far as concerns the direction of the projects, and the works of construction, defense, preservation, and improvement, and the technical part of the distribution of the waters and the government of navigation."

The minister of agriculture, industry, and commerce is in another law charged with duties relating to the use of waters in irrigation and the cultivation of crops thereby; and the minister of finance controls the rents and has the economic management of the waters of public canals.

As in the French administrative organization, there is a bureau of civil engineering attached to the ministry of public works, but the organization is not so broad or complete, nor the employment of the engineers so general throughout the country, in the guarding of the streams and waters and the regulation of works, as in France. But, for the valley of the Po, the systems of the Lombardian and Piedmontese governments have been virtually perpetuated, so that there is in this great irrigation region almost as complete an organization as that already described for France.

Title VII of the public works law of 1865 treats of the civil engineering service under the direction of the public works ministry, but in a provisional manner only, maintains in force an old law of 1859, speaks of a new project for reorganization which will be brought forward, makes some general enactments relating to assignment of general government engineers to duty as engineers to provincial governments, and recognizes the existence of provincial corps of engineers which already have been spoken of for Lombardy and Piedmont, for instance.

There have of late years been several movements to reorganize the engineering service for all Italy, but from various causes these have not been consummated. There is, however, a general and permanent hydrographical commission, composed of civil engineers of the hydraulic service, which supervises all affairs con-

nected with water-courses and water-rights, and the minister of public works is himself a civil engineer of high attainments. There is a special hydraulic service too, as in the French system, and all applications for water privileges have to be considered as much at length and in detail, and more particularly from the engineering, technical, and physical points of view, and less from those of the law and local sentiment, than in the case of the French system. Thus, the engineers are made the judges of the local necessities and public advisability, or utility, and report directly to the central administration, and upon a broader view of each proposition than the French engineers are required to. While the local administrative officers are called upon for their opinions separately.

Local Administrative Organization.[1]

The local administration is made up as follows: Under the government as now organized, the valley of the Po is embraced within the departments of Piedmont, Lombardy, Venetia, and Emilia; and they comprise twenty-eight provinces. These provinces are the real administrative units, each being presided over by a prefect, as in the case of the departments of France. The provinces are divided into communes, and each commune is presided over by a chief magistrate called a syndic. The prefects and the syndics are appointed by the king, and there are provincial councils and communal councils associated with these officers respectively, as in the case of the French departmental administrative system. But unlike the French organization, the communal unit has direct communication with the central government, and is really the important factor in the ordering of internal affairs.

In general terms, therefore, we find the prefects of the provinces and the syndics of the communes charged with the administration of the affairs of the water-courses locally, in so far as the policing of the stream and the enforcing of regulations are concerned, but the engineers and the ministry of public works regulate the construction and maintenance of works in the streams and the diversion of water from them. This, of course, relates more especially to the streams of the public domain. But it is to be remembered that in Italy all streams of any importance as irrigation feeders are public, and that, except on insignificant water-courses, or

[1] Encyclop. Brit., Vol. XIII, "Italy," pp. 448–464; see, also, De Buffon, Vol. II, and Smith, Vol. II.

those remote from the centers of irrigation, or in mountain valleys, there are no claims of right to the waters or to the channel beds, founded on riparian proprietorship.

There are, however, some streams controlled altogether by associations of landholders or canal and water-right owners, and over which the government has only a supervisory duty based on the ground of police power. But these rights are founded on ancient special grants of proprietorship in the waters and channels themselves, and not on the ownership of the bank lands.

With respect to administration, then, the communal and provincial officers are the chief local executive functionaries in care of the policing of streams, generally, to carry out the regulations which emanate from the central government; and the engineers are a distinct branch of the administration, having to do with the question in their separate class of duty.

Administrative River Regulation.[1]

The regulations under which the affairs of the water-courses of the valley of the Po are administered, are largely of origin in the first half of the present century, and after the formation of the Piedmontese and Lombardian governments of that time. The principles involved are quite similar in them all, and it is only necessary to give one example here, in addition to what is incidentally said relative to this subject under other subheadings, to sufficiently present the essential features of the system and the spirit in which it finds its motive.

Piedmont.—In Piedmont the water-courses and royal canals were in charge of an administrative organization known as the *Agency of the domain*, the subordinate employés of which were river-guards, apparently corresponding in general duty to those in France, heretofore written of. The instructions to the various "Agents of the domain" filled a large octavo volume, and went into great detail. Articles 357, 358, and 368 provide in effect that the class of agents of the domain to whom they are particularly addressed should guard the rivers and streams, watching for infringements of the regulations concerning diversions of waters and building of structures in the channels, aiding those who observed the laws, and reporting those who transgressed, to the director of the domain, and, after obtaining a warrant, proceeding to their

[1] De Buffon, Vol. II; and Smith, Vol. II.

arrest and the enforcement of the law concerning the establishment of things in their original state.

The agents, say these instructions, ought to be continuously on duty, "for water is a thing which men are prone to take without due authority and to the grave injury of their neighbors and the public, and stream channels easily receive serious injury from thoughtless building in them." These agents are enjoined also to be thoroughly acquainted with the laws and regulations touching water-courses and their duty connected therewith, and to know well the character and extent of rights which people have on the streams within their districts. The domain receiver in each district is charged with the duty of seeing that works are constructed under concessions or grants in conformity to the terms thereof, and that they are properly maintained according to the opinion of the engineer. And he must report to the director of the domain all that is worthy of attention from that officer.

Regulations for Water-Courses.[1]

Piedmont.—The affairs of rivers and torrents of all classes in Piedmont were subject to regulation under a decree, of 1817, of which I present an abstract, as follows:

Navigable Rivers.—All persons were prohibited from diverting waters from navigable streams, and from placing any structure in a channel of any such stream, under a penalty of $2 to $30, and also the obligation to remove it and restore things to their former condition. Old dams, for whatever purpose used, could not be changed or repaired without administrative permission and supervision, under pain of a similar penalty and obligation to restore them, etc. Trees and underbrush growing along the banks could not be cut, except by administrative authority and inspection, nor could any clearance be made for cultivation within a distance of about 350 feet from each bank, without due authorization after inspection, under pain of a penalty of $2 to $20.

Owners of alluvial lands along rivers or torrents had to keep their cultivations at the prescribed distances therefrom, or coming within those distances had to have a permit for such action, from the intendant of the province, guided by the advice of the communal council, and of the provincial engineer. Penalty for infringe-

[1] See, De Buffon, Vol. II, pp. 314-319.

ment, $6 to $40; together with destruction of the plantation. The digging of wells or opening of springs within certain distances of the banks of streams was prohibited: penalty, $20 to $60. Owners of bank property were, under regulations and by permits, allowed to protect the banks from washing; but revetments of masonry, brushwork, or other protecting constructions, might in no case project into the channels, except as these might be planned and executed under the supervision of the provincial engineer.

The intendant of the province, on the advice of the engineer, had immediate direction of these matters, and there was an appeal from him to the direction-general, which acted on the advice of the central commission of engineers.

Non-Navigable Streams.—All persons were prohibited from diverting waters from or placing any structure in the channel of any non-navigable stream, ranked as a stream of public utility or importance. For permission to divert water from such stream, or erect any work in its channel for the purpose of using its water or protecting its banks, application had to be made to the intendant of the province. The intendant directed an examination to be made by the engineer, as a preliminary to all permits, and interested parties were notified to meet the engineer on the ground, and make any desired representation to him about the project. The only difference between the treatment of cases on these streams and those on navigable ones was in the form of proceedings and permits.

The free flow and open channel of small streams had to be preserved. Bank owners might, on due authority, construct works to protect the banks, but, if calculated to arrest the currents, or deflect them injuriously against either bank, they were removed. The management of the details of the affairs of such streams was intrusted to syndical associations of proprietors interested. A provision inserted in all grants of right to water, or right to construct works in a stream, was that the proprietors should constantly keep the weirs of the dams open, to leave ample space for the passage of flood waters. For offenses against these regulations concerning non-navigable streams, similar penalties were imposed to those specified for like infringements of the rules applicable to navigable rivers.

Old dams and structures for diversion of the water, or for ap-

plying it in use, in any way, might not be changed in form, dimensions, or elevation, without due permission issued after examination. The channels of these streams might be kept clear to a standard width, fixed for each stream in each commune, at the expense of and by the riparian proprietors, under direction of the provincial engineers. The banks of these water-courses might be cultivated, but neither roots nor branches might encroach on the bed of the stream. Islets could not be cultivated or cleared, except by the permission of the intendant of the province. When such water-courses had low banks, subject to overflow, the riparian proprietors were under obligations to keep the channels clear of deposits down to the normal elevation for the bed. Consumers of water, or users of it for power purposes, were called on for a share of these expenses for such maintenance of channels.

General River Regulations.

Lombardy.—The following general regulations for water-courses for the province of Mantua, made while wholly under Austrian dominion, and continued while a part of the Lombardian kingdom, will convey a good idea of the general policy and extent of power in this respect exercised by that government:

River Regulations for the Province of Mantua.

"Article 1. The damming up, directly or indirectly, of water-courses of any class or kind, or the alteration of any escapes, weirs, or channels, in such manner as that the water may be turned to the use of the offending party, or to the injury of others, is prohibited under a penalty for each offense of 2,000 *lire* (about $400), of which, half shall be granted to the informer. Failing payment of the fine, the offender shall be sentenced to imprisonment with hard labor for one year.

"Article 2. The chief sources of injury to the banks, and of obstruction to the free course of the waters, are trees, underwood, or bushes of any kind. It is forbidden to plant these on the banks of the public canals and rivers, and such as exist shall be cleared away within twenty days from the publication of this edict. After this time the wood shall be cut down by the public officers, and sold for the general benefit of the associations of the rivers and canals.

"Article 3. The lines of piles placed in the channels to facilitate fishing cause serious damage. These shall all be removed and sold for the general benefit; and, in future, whoever replaces such works shall be subject to a fine of 100 *lire* (about $20), whereof one half shall be granted to the informer.

"Article 4. The proprietors of mills and their work-people are forbidden to raise the water, by any means whatever, above the levels either already fixed, or to be fixed hereafter. During floods, they shall be careful to open the escapes, so as to prevent damage. Each offense against this rule shall subject the offender to a fine of 200 *lire* (about $40).

"Article 5. All proprietors of ditches shall be bound to maintain them in thorough repair, so that no water may escape from them into the public roads, or in any way cause damage to other parties, under a penalty for each offense of 200 *lire*, in addition to payment of all expense for injuries done.

"Article 6. All employers of water shall obtain the quantities defined and fixed by their titles and grants. Forfeiture of all right to water shall follow the illegitimate alteration or extension of the prescribed areas of irrigation.

"Article 7. Like forfeiture shall be the consequence of any improper interference with any of the various kinds of works on the canals. When a change in these is desired application shall be made to the magistracy of water for the province, who will order the proper steps to be taken.

"Article 8. Employers of water who have irrigated the areas assigned to them, shall be bound to allow the surplus waters to flow off freely for the benefit of lower lying lands. To this end every proprietor shall be bound to establish drainage channels for the collection of the surplus waters; and neglect in doing so shall entail forfeiture of all right to water from the respective canals.

"Article 9. [Orders that periodical inspections of the canals be made by the prefect or vice-prefect of the province, so as to insure observance of the provisions of the edict.]

"Article 10. It being a common but mischievous practice for parties to carry water to lands so placed that the surplus waters are entirely lost, it is ordered that every landed proprietor shall cause to be made, at his own expense, a map of his property, on which the irrigable land shall be shown in its true dimensions, and with its heights above the sources of supply of water clearly exhibited; also, all the water-courses, culverts, roads, or principal canals, aqueducts, weirs, locks, and every other kind of works, shall be plainly shown. This map shall be preserved as a record in the office of the magistracy of waters, and shall be corrected from time to time, as changes are duly sanctioned by the proper authorities. Neglect of the present order shall be punished by loss of rights to the water.

"Article 11. No changes of any kind shall be effected but under the orders of the magistracy, executed by the prefect or vice-prefect.

"Article 12. The conservators of the different irrigating associations are enjoined to watch over the efficiency of the works under their charge. They shall make an annual inspection, and submit a report on the works to the congregations of their respective

associations, indicating all the repairs or new structures required, and estimating the probable expense thereof. The visits shall be made during the first days of the month of February, and the congregation shall be held about the middle of the same month. By which means all needful repairs may be completed about the middle of April, when the demand for water arises.

"Article 13. The conservators shall be careful to clear the canal beds of all water plants and weeds, causing them to be dug out by the roots for some distance from the water's edge, throwing the refuse clear of the embankment. If necessary, clearances of this class shall be executed three times a year.

"Article 14. All parties are enjoined to receive, and execute with promptitude and good will, the orders of the conservators of the different associations. Disobedience shall be punished by a fine for each offense of 200 *lire* (about $40), which shall be increased at the discretion of the magistracy; if any offense be committed a second time by the same party, it shall be lawful to proceed against him under the provisions of the municipal laws.

"Article 15. The annual tax shall be paid by all parties within the time prescribed by the congregations, and defaulters shall be proceeded against without further notice.

"Article 16. Parties not possessing legal rights to irrigation shall not use, even to the smallest extent, the waters of the canals. The first offense against this rule shall be punished by a fine of 1,000 *lire* (about $200), with forfeiture of all the irrigated produce, and compensation to parties injured by the misappropriation of the waters. The second offense shall be punished by the confiscation of the land illegitimately irrigated.

"Article 17. We reserve to ourselves the right to make grants of water for irrigation; and we hereby declare, that if it should come to our knowledge that arable or forest or meadow lands have been broken up for the purpose of creating rice fields, in excess of those fixed by considerations of public police, and duly limited thereby, the grants thus abused shall be revoked; and we give notice that we will not in future allow any new rice cultivation to be established, until it has been proved to our entire satisfaction that the lands to be so employed are all in such low lying localities as to be unfitted for use under any less injurious kind of cultivation.

"Article 18. In making grants, we do not thereby vest in the grantee the right of property in the water, but only the right to use it either in irrigation or for hydraulic works. The right of property shall remain as heretofore among the rights appertaining to the crown.

"Article 19. In all grants for the use of water whencesoever derived, from *colature*[1] or from works, we maintain in full force

[1] *Colature:* drainage waters from irrigations.

the provisions of existing agreements, in consideration of the benefits hitherto derived from their observance.

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"Article 26. To insure the reform of abuses, and to protect the interests of the royal treasury, all employers of water shall be bound to submit their titles, after due notice, to a deputation of officers, which from time to time shall visit the canals, with full authority to investigate and dispose of all cases brought before them, according to their judgment.

"Article 27. The guards and police shall use all diligence in protecting the interests intrusted to them, and shall denounce all contraventions to the secretary of the magistracy of waters. In cases of neglect, the offending party shall be declared incapable of again serving the state; but if collusion or participation be established, he shall be sentenced to imprisonment with hard labor for a period not exceeding three years, according to the decision of the magisterial chamber.

"Article 28. The magisterial chamber shall determine all further provisions necessary to the execution of our laws, and shall decide on all matters connected with the waters of the province." —[Smith, Vol. II, p. 208, *et seq.*

Construction of River Works.[1]

The Kingdom of Italy.—The general law concerning public works declares that a prerogative of government is the supreme direction of all matters pertaining to the management of public waters, rivers, torrents, lakes, streams, canals, and natural drainage ways, and, at least, the inspection and supervision of works in and relating to such waters or water-ways. These works are divided into four classes, according to the interests involved: 1, those executed and maintained exclusively at general government expense; 2, those built and maintained by the government with the coöperation of one or more provinces in each instance; 3, those carried out and kept up at the expense of interested associations of landholders; 4, those, by riparian proprietors acting as individuals or in associations. The administrative authorities of the general government have immediate supervision of construction and maintenance of works of the first two classes, while the provincial authorities have direct control of those of the last two classes, and the general government exercises its right of final supervision and inspection of them.

The works of the first class—whose cost and expense is borne

[1] General Law on Public Works, Title III, Chapter I, March, 1865.

exclusively by the general government—are those which are solely for the improvement of navigation and preservation of the beds, alignments, and banks of rivers, streams, and large canals connected with the general navigation system, and those of and connected with the artificial canals, of irrigation as well as navigation, belonging to the state, and not otherwise disposed of by special agreements.

The works of the second class—whose cost and expense is borne by the government, with the provinces, individuals, and associations interested—are levees and accessory works along embanked rivers and tributaries, from the point where the waters commence to run between embankments, and wherever the works are of great public importance, also, embankments, channel rectifications, and other works made for the purpose of regulating such rivers, as well as those of canals of navigation that interest more than one province but are still not connected with the general governmental system of water-ways.

The expense for works of this class is divided as follows: "Deducting the net patrimonial rent of the associations, one half of the remainder is charged to the state, and the other half is divided equally between the province or provinces interested and the associated and individual land owners." "In these costs are included the expenses of inspection of works and guarding of banks."

Works of the third class—paid for by associated and individual land owners interested—are, defending and maintaining the banks, channels, and good régime of rivers which are not leveed and even though navigable, the maintenance and improvement of stream and torrent beds, generally, where the action of the waters threaten wide scopes of country with damage, and the embanking of small streams for limited distances for local benefit of interested parties.

The general government contributes towards works of this class under the care of associations of landholders, when they are of importance to navigation or have an influence upon the security of government works; but the quota contributed by the state towards such works cannot be more than a quarter of the total cost, and is fixed in proportion to the importance of the interests involved. The provinces are, sometimes also, called upon for contributions to such works in proportion to their degree of importance to the lands of their territory.

Works of the fourth class—those exclusively at the cost of

riparian proprietors, saving that these have the right to compel other interested parties according to the civil law—are the embankments of tracts outside of the river main-embankments, and the embankments on and repairs to the banks of rivers and torrents which serve to defend one or a few properties only. The minor courses of public waters, distinct from rivers, torrents, and streams, acting as great public drainage ways, are maintained at the cost of the riparian proprietors whose lands front the channels, and by the proprietors whose lands they drain, and by the possessors or users of their waters. For such maintenance and to regulate their régime, associations of the above named parties interested may be organized in accordance with established provisions of law.

Whenever works of the above classes are of public importance, the government by law orders them carried out, and the expense is borne on public, provincial, district, or private account, according to their class. Thus the principle of compulsory action in hydraulic works, so essential to systemization and necessary to success, is quite fully recognized in this law.

Policing of Public Waters.[1]

The Kingdom of Italy.—The general law on public works declares that no one may make works in the beds of rivers, torrents, streams, public drainage ways, and canals of the public domain—that is, in the space between the stable banks of the channels—without a permit from the administrative authority; and in case of the bed having a shifting bank, the proper line for the permanent bank will be fixed by the prefect after all interested parties have been heard. The branches of such water-courses are subject to these rules although at certain times of the year they may remain dry.

The right of riparian proprietors to protect their banks is subordinated to the conditions that the works or plantations for the purpose do not interfere with the free flow of the waters, neither endanger nor damage the properties of others, public or private, the navigation, the diversions, nor works of any kind legitimately established, and prefects are charged with the duty of exacting security for these conditions.

Certain works and acts are absolutely prohibited upon public

[1] General Law on Public Works, Title III, Chapter VII, March, 1865.

waters, their beds, shores, and defenses, as follows: (a), the formation of fishery inclosures which may interfere with the flow of the stream; (b), planting of trees within the water-way or so as to diminish the normal water-way, or necessary even flow of the waters; (c), the extracting or burning of stumps that sustain the banks of torrents, at a distance less than nine metres from the ordinary water line; the extraction or burning of stumps that sustain the banks of rivers, streams, and canals; (d), the establishing of plantations on alluvial deposits on a river shore at a less distance from the opposite bank than the official width of the water-way as determined by the prefect after hearing all interested parties, and after receiving a report from the provincial engineer; (e), the planting of trees or shrubs upon levees or banks of streams, rivers, torrents, or navigable canals; (f), digging, plowing, or excavating within certain prescribed distances of levees, banks, and lines of overflow; (g), all acts tending to alter the condition, form, dimensions, resistance, and convenient use of embankments or levees and their accessories; (h), the variation or alteration of stream banks or interference with works for their protection; (i), the pasturage or permanent keeping of cattle, sheep, or other grazing animals on the levees or their accessories, and the banks and slopes of public canals; (k), the opening of excavations, for whatever purpose, at distances from the banks of rivers, torrents, etc., less than those laid down in regulations or local usages, or than provincial administrative authority recognizes to be necessary to avoid the danger of diversion or of wrongful drawing out of waters; (l), the construction of any and all works in the bed, on the banks, or upon tow-paths of streams or canals which might prejudice the freedom or the security of the navigation, the operation of floating docks or of ferryboats, or the floating of timber and rafts.

Certain other acts or works are allowed, upon permits to be obtained from the prefects, and under conditions to be imposed by them, as follows: (a), location of permanent anchorages to facilitate the operation of floating docks, ferryboats, etc.; (b), the construction of spur dykes to protect embankments and shores; (c), the plowing up of woody or bushy land within 100 metres of the ordinary water line; (d), the formation of plantations or alluvial deposits in river beds beyond the line of normal width; (e), the formation of levee crossings for roadways; (f), the conversion of temporary wingdams for diversion of public waters, into permanent ones, etc.; (g), changing the usual position, structure, and

dimensions of wingdams of diversion in streams not considered permanent; (h), excavation in the gravel and sand beds of rivers, torrents, etc., to lead waters to canals; (i), changing the form and position of stable wingdams of diversion on streams; (k), reconstruction of headworks of canals, bridges, and similar existing structures in beds of streams, torrents, rivers, and canals, belonging to the domain; (l), changing position of floating mills; (m), hauling out gravel, sand, etc., from beds of rivers, torrents, streams, and public canals, at points other than those where practice has established a custom; (n), the occupation of shores of lakes, etc., with permanent works.

Certain other works and acts are permitted upon authorizations from the minister of public works, and under conditions by him imposed, as follows: (a), the conversion of temporary and unstable wingdams for the derivation of waters from rivers and torrents, into stable and permanent structures; (b), the variation of the form and position of openings of diversion in all cases; (c), the construction of works on the shores of rivers and torrents that may alter or modify the condition of diversion; (d), the construction of new works in the beds of rivers, torrents, streams, public drainage ways and canals of the state, whether wingdams or other stable works for diversion of waters; (e), the construction of new drainage boxes through main levees, or the removal of those existing; (f), the establishing of new floating mills, in rivers, torrents, etc.

Very heavy penalties are named for the violation of these rulings, in the penal laws of the country.

SECTION III.

Administration of Government Canals.

The Administrative Bureau.[1]

In Piedmont, and also in Lombardy, the greatest irrigation works were the property of the governments, respectively. Some of the great canals date from very early times; indeed, their origin is quite obscure, except that it is known about when they were

[1] See, Smith, Vol. I, p. 120; also, De Buffon, Vol. II, pp. 218–220; Law concerning Public Works, 1865.

built. These works were maintained under the supervision of government engineers, but, as a general thing, their revenues were farmed out in bulk to some contractor or association, who received the waters at certain outlets from the main distributaries, in large volumes, undertook to distribute them to the consumers, collect the revenues, and pay the government certain fixed sums annually for the privileges. This financial system was open to and resulted in great abuses, but with that phase of the question we are not here concerned.

There were also on these canals certain old water-rights, conceded by former governments to consumers or speculators, for some consideration or service rendered in years or centuries long gone by. Some of these rights were free from rate paying, while others were subject to an annual payment, generally at low rates. But, however waters were distributed, or under whatever right of use or rate of payment, the works were the special charge of government civil engineers, and their maintenance, extension, and remodeling contributed to develop a service of unprecedented skill in hydraulic construction and science.

Piedmont.—In the preceding section of this chapter I have spoken of the care and regulation of public streams in Piedmont through the services of the agents of the public domain. It now remains to speak of the management of the public canals. These are in reality great artificial public streams from which private canals draw, and considerable populations are supplied. Their maintenance and general management was committed to the care of the ministry of finance, as a separate trust from that of public works generally, which were in charge of a minister of public works. The fact that the canals were a property yielding a revenue to the state in which the finance was more interested than any other bureau, is advanced as the reason for this arrangement.

Attached to this ministry of finance was an office of works, which was the executive agency in charge of construction and maintenance of the canals. The general management of the department was intrusted to the intendant-general of finance, the chief executive officer under the minister himself, but the *personnel* of the service was almost exclusively made up of civil engineers, of whom there were about twenty, together with their assistants and subaltern helpers. The duties of this corps were connected entirely with the professional and practical labor of construction,

maintenance, and operation of the works. The financial management and care of distribution of the waters were under the control of the contractor or farmer of the canal revenues, who ordinarily leased the waters in bulk for a period of nine years, and then sublet the water privileges. Thus, there was an entire separation between the executive management of the canal works and the business management of the operations of distribution.

Under the engineers and their assistants there was a subordinate organization of guards, or superintendents and overseers, composed of one chief and thirty-five ordinary guards, whose duty it was to take local charge of the works. These were generally men of experience in the management of canal works, and they lived in houses, built for the purpose, close alongside of their sections of duty. To them were intrusted the keys of the distributing gates from the main canals, and hence they were persons of considerable importance, and not infrequently became skilled as practical hydraulicians.

Articles 359 to 367 of the "Instructions to agents of the domain," spoken of in the last section, contain provisions regulating the financial relations between this establishment and the lessees of the waters of the canals. Articles 630 and 631 provide for the duties of the engineers in connection with the maintenance of main outlets for distribution, the expense of which was to be borne by the lessees of the waters in each instance. Other articles prescribed in great detail the duties of the "agents" and of the "engineers" who were the officers of the two lines of administrative operatives under the intendant-general of finance. Of these duties, it is noteworthy that each agent and each engineer was required to keep a daily journal in detail of all his official actions and observations, according to a prescribed form, and to return such journal in duplicate with a summarized statement in the form of a report, also in duplicate, to the intendant, monthly, who retained one copy and transmitted the other to the intendant-general, together with his observations. In addition to this, quarterly financial reports were required from all officers or agents in charge of works, and professional reports on the condition of works, from the engineers, also every three months.

The state, through the medium of this establishment, administered, maintained, and operated the canals, giving out the waters to the branch distributaries whence they were sub-divided, and the rents collected by the employés of the farmer of the revenues,

as elsewhere spoken of. This system of farming the revenues to an individual, or individuals, was done away with in 1854, when all the waters thitherto thus disposed of were leased to the "Association of irrigation west of the Sesia," as is explained in a subsequent chapter; and the system of maintenance and operation of the works by government employés was also done away with by the leasing of the canals themselves to the Cavour canal company, in 1862, also spoken of in detail hereinafter; and, finally, the management of the works, again by the general government of Italy, upon the failure of the Cavour canal company, remains to be mentioned.

Government Canal Regulations.

Piedmont.—Returning to the times of Piedmontese administration of the royal canals in the upper part of the valley of the Po, to carry forward the subject in a complete manner, I transcribe the following draught of "Regulations for the administration of the royal canals of irrigation," under which the works were managed until turned over to the Cavour canal company, and which constitute one of a number of regulations incorporated into the "Instructions to the agents of the domain," heretofore mentioned.

Regulation for the Administration of the Royal Canals of Irrigation.

Of the maintenance of canals:

"Article 1. All the royal canals of the kingdom are subjected to the present regulation.

"2. The general control of the royal canals is vested in the agency-general of finance, the executive duty being performed by engineers and guards appointed by it.

"The latter, with the guards appointed by the farmer of the canal revenues, shall take an oath of fidelity in the presence of the judges of their respective districts.

"3. The engineers and guards are charged to prevent all interference with the waters, works, and employers of the canals.

"4. The articles of the regulation of the twenty-ninth of May, 1817, are maintained in full force.

"5. No one unprovided with a legal grant or right can make any use whatever of the canals; and any interference with the free course of the waters in the main channel or branches thereof is forbidden. Violations of any part of this article shall be punished by a fine of from 50 to 150 *lire* (from $10 to $30) for each offense, in addition to compensation for damages.

"6. Parties having a legal grant of water, but taking more than the quantity they are entitled to, or using at a different hour from that specified in the agreement among the employers of a

common channel, or violating in any other way the terms of their grants or agreements, shall be subject to a fine of from 50 to 100 *lire* ($10 to $20) for each offense, in addition to compensation for damages.

"7. Whoever shall raise or lower the gates of the outlets or escapes, alter, break, or deface the chambers of the works of measurement, force the locks of the same, or change their dimensions, shall incur a fine of from 150 to 300 *lire* ($30 to $60), in addition to the amount payable for damages. When the offense is perpetrated on crown property, the pecuniary fine shall be accompanied by imprisonment for a period varying from one to six months.

"8. Employers of the canals shall maintain their irrigation outlets and channels in forms prescribed by their grants, under a penalty of from 50 to 100 *lire*.

"9. The water flowing from irrigated lands, commonly called *coli (colatura)*, shall be permitted to enter the canals freely, except when special agreements to the contrary have been entered into, under a penalty of from 50 to 100 *lire*, in addition to the price of the waters intercepted.

"10. It is forbidden to fish in the canals, or to excavate sand from them, or to use boats on them at any time, under a penalty of from 10 to 30 *lire*.

"11. The agency-general of finance may permit fishing, navigation, or excavation of sand, having first procured the opinions of the engineer and the director of the domain. Such permission ought to indicate clearly the portion of the canal to which it applies. It can be granted only for a period of not longer than one year, and is null and void unless registered by the grantee at the office of the direction of the domain, and of the local secretariat of the province.

"12. It is forbidden to establish, without the authority of the agency, bridges, fords, or ferries, and, also, to cross the canals, either on foot or with cattle, under a penalty of 10 *lire*, in addition to the expense of destroying works executed in contravention of this article.

"13. [Repeats the above with respect to minor works.]

"14. Whoever takes possession of land along the canals which belongs to the royal domain, removes the landmarks, makes excavations, carries away the produce of the plantations, or traverses the banks with cattle, carts, or conveyances of any kind, shall incur a fine of from 5 to 10 *lire* for each offense, in addition to the repair of any damages which may be caused, or to the cost of the things carried away.

"15. The possessors of land fronting or adjacent to the canals are forbidden to open new springs, to excavate ditches, to form ponds, water-courses, or channels of any kind, within a distance of 200 metres (nearly 220 yards) from the said canals, except in such cases as may be specially decided upon by the engineers,

who will then fix such distances as may seem to them sufficient to prevent any leakage of the waters of the canals into the works referred to.

"It is also forbidden to the aforesaid possessors of land to plant trees within a distance of 3 metres from the boundaries of the canals. Infringements of this article shall be punished by a fine of 10 *lire*.

"16. It is forbidden to cut the trees on the canal banks, or to carry away the prunings of the same, under penalty of a fine equal to double the value of the trees or prunings. If the trees cut and carried away shall exceed the value of 25 *lire* (about $5), the offender shall be imprisoned for not less than one month, in addition to paying the fine as above.

"17. Parties acquiring by legitimate titles any right to the plantations along the canals, shall not be allowed to cut or prune them except at the times and to the extent specified by the engineers in charge.

"18. All parties are forbidden to pasture cattle on the banks of the canals at any period of the year, under a penalty of from 1 to 3 *lire* for each animal."—[Smith, Vol. II, pp. 307–310.

Lombardy.—In Lombardy the organization and regulations affecting the government canals was substantially the same as in Piedmont, so that there would be nothing added to the useful data of this report by introducing here anything specially relating to this branch of our subject for that country.

The Kingdom of Italy.—Upon the unification of the Italian government, all the public canals of Lombardy and Piedmont, not leased to the Cavour canal company, were given over to the charge of the ministry of public works for all Italy.

Something will be seen of the management of a portion of these in a subsequent part of this report, and as it is substantially that followed by the Piedmontese government, with the exception of the different and broader organization of its administrative department, it is unnecessary to refer in detail to it here.

The ministry of public works, with its bureau of civil engineering, constructs, maintains, and operates the canals; the ministry of finance leases and otherwise economically manages the disposal of the waters; and the ministry of agriculture, industry, and commerce encourages and otherwise deals with irrigation and cultivation thereby.

AUTHORITIES FOR CHAPTER X.

De Buffon.—[Work cited as an authority for Chapter IX.] See, Vol. II, B. VII, Ch. 39, Divs. I and II; Ch. 40, Div. I; Ch. 41, Div. I; B. VIII, Ch. 45, Div. I; and elsewhere as cited.

Smith.—[Work cited as an authority for Chapter IX.] See, Vol. II, P. VI, Ch. I, Secs. I and V; Ch. II, Secs. I and V; and elsewhere as cited.

Sardinian Code.—"The Civil Code of the Kingdom of Sardinia." Edited and annotated by A. Boron, Advocate, etc., 2d ed. (Italian). Turin, 1857.

Italian Code.—"The Civil Code of the Kingdom of Italy." Edited, annotated, and compared with its predecessors, by Domenicantonio Galdi, Advocate, etc. (Italian); royal 8vo., pp. 1,400; Naples, 1865.

Ency. Brit.—Encyclopædia Britannica. Ninth Edition. Article "Italy."

Letters, etc.—Letters from the late Hon. Geo. P. Marsh, U. S. Minister to Italy; dated at Rome and Florence in 1882, and addressed to the writer hereof, in answer to letters of inquiry on the subjects of this report.

Laws, etc.—The General Law of Italy concerning Public Works, passed March 24, 1865; and the substitution for Chapter V of Title III of the above, entitled Law concerning the Diversion of Public Waters, passed August 10, 1884 (Italian). Received from Hon. A. Peiroleri, Minister of Public Works, Italy, through the courtesy of Hon. Baron Fava, Italian Minister, and Sig. Cav. de Foresta, Charge d'Affaire, Washington, D. C.

CHAPTER XI.—ITALY[3];

REGULATION OF IRRIGATION PRACTICE.

SECTION I.—*Distribution and Measurement of Waters.*
Hydraulic Science and Practice.
The Problems of Distribution and Measurement.
The Piedmontese Legislation—Sardinian Code.
Remarks on the Sardinian and Italian Codes.
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SECTION II.—*The Rights of Irrigators:*
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SECTION I.

MEASUREMENT AND DISTRIBUTION OF WATERS.

Hydraulic Science and Practice.

Until within very recent years, when there has been much activity and emulation in the perfecting of means and methods for the economical and exact measurement and distribution of waters in irrigation in France, in British India, and also on some special works in Spain, the works and regulations designed for the attainment of these ends in northern Italy have stood alone as evidences of an attempt at the systematic application of scientific principles to the details of an extended and complex practice of the art of conducting and measuring water in open channels for irrigation.

Commencing in the centuries that have passed, hydraulic science developed with the advance of irrigation and drainage practice in Italy. For a long time this was its repository; and out from this country it subsequently spread.

"With the revival of knowledge in Italy, the art of hydraulic engineering was called into existence, and the extensive demand for skill in its details created early a supply of men familiar with all of these. Hence the remarkable number and great talent of the executive engineers, by whose exertions, rewarded and stimulated by their wealthy and powerful employers, that vast network of irrigation channels was spread over the entire surface of the country."—[Smith, Vol. II, p. 135.

The physical, social, and political conditions of northern Italy alike contributed to the growth of this science: the difficulty of tapping the chief sources of water supply, except by means of great works, requiring skill and technical knowledge to plan and construct; the necessity, produced by climatic and hydrographic circumstances, for making these works most substantial, and, consequently, costly; the complexity of the natural water supply system, and the confusion as to water claims which had grown up; the absence of system in the earlier works and projects; the consequent extreme complexity of works; the great value of water in irrigation; the wide destruction of property occasioned by waters of floods; the alarming unsanitary results of unskillful irrigation, insufficient drainage, and injudicious embanking of lands; and the natural outgrowth of confusion and litigation which resulted, made the necessity for men in command at once of scientific knowledge and practical skill in hydraulic work. In following out the systemization of irrigation works and practice in that country, not only have the main works for the diversion and conducting of waters been in charge of those trained and educated to the task, but the practical studies and applications in the most minute details of distribution and measurement of waters have been equally committed to the care of specialists.

"Under this system, it is astonishing to see the extent to which minor canals have been executed. The whole surface of the country is covered by them as by a dense network. At all levels, and by the use of various ingenious works, they pass over, or under, or through each other, in such a way as to preserve individual rights uninterfered with, though the result to outward appearances, is a system of such marvelous complexity as to make the observer conclude it must lead to interminable disputes."—[Smith, Vol. I, p. 41.

We should, hence, expect to find, and we do find, that government itself has done much towards the advancement of knowledge and skill in this practice. In Piedmont, for instance, not only was there an establishment of civil engineers in the employ of the government and in charge of all public works, and having supervisory duties connected with water-courses and works relating thereto, but the study and private practice of the profession itself was the subject of state solicitude and aid.

"The economical importance of irrigation in Piedmont has naturally induced the government to furnish all practicable facilities for its study. The education of the hydraulic engineer is conducted with care, and no one is allowed to practice the profession without having graduated regularly at the university of Turin."—[Smith, Vol. I, p. 12.

That government established and continuously maintained stations for experimenting on and observing the flow, measurement, and distribution of waters, which were attached to the educational institutions, and made accessories to instruction in hydraulic science, so that an education as an hydraulic engineer was, in that country, eminently practical as well as theoretical in its course and results. The civil engineers were graded, according to their attainments, as hydraulic engineers, civil architects, and surveyors or land measurers, and no one not specially qualified for the higher rank of hydraulic engineer was permitted to practice that branch of the profession. Such the men to whom were confided the works of irrigation in Lombardy; such the care with which men for this service were trained in Piedmont; and now the Italian government equally encourages the hydraulic art and science by means similar, and, hence, the details of the Italian system and the rules of practice and principles of law attending and governing that practice, are well worthy of study.

The Problems of Distribution and Measurement.

Next in order to those great complications and contentions which with irrigation enterprise are developed between governments and the grantees or employers of water for irrigation, between different grantees or employers, and between these and riparian proprietors, come questions which grow out of the relations between those who have water to distribute and those who want it to use—between the canal owners or managers and the irrigators. Here are en-

countered the problems of equitable distribution and accurate measurement.

Water is contracted for and delivered in irrigation under three general systems of reckoning: the first, delivery to irrigate any certain crop or area of land for the season or for the time; the second, delivery of some certain quantity, in bulk, of water; the third, delivery of some certain flow of water for a certain period of time. The contentions which arise and the sources of dissatisfaction with results, to both the canal or water man and the irrigator, under each of these systems, will form the subject of a chapter in another part of this report, so that it is sufficient simply to call attention to them here as being the moving cause of much solicitude and study in all well settled irrigation regions. Irrigators generally, in the older irrigation countries, prefer the system whereunder they can have measured out to them a fixed quantity of water at certain periods of time, and then have the liberty to do with it as they choose. The difficulty of accurate measurement, under the very many and varying conditions attending the delivery of water, in new countries prompts and often makes necessary the adoption of the other systems.

In the measurement of waters two distinct ideas are to be held in view. These are: what unit of measure is to be taken; and, what means of measurement are to be adopted. All civilized countries have a system of weights and measures applicable in the meting out of ordinary merchantable commodities and lands, but few have any established system for the measurement of waters. Such a system grew up in northern Italy, or rather, several such systems found birth and development in the various provinces or petty states of the valley of the Po. These systems were far from perfect, as we may view them now from the standpoints of an advanced hydraulic science, but they served a most useful purpose, and were the starting points from which irrigation engineers have sought to advance in other countries. We find the laws and regulations of irrigation referring to certain standard measures and measuring apparatus, and, in view of what has preceded, we are prepared to appreciate their meaning, without going further at this time into the definite interpretation of these standards to those of our own country.

Distribution and Measurement—Piedmontese Legislation.

In Piedmont water was distributed under three systems of delivery. The *first*, according to the quantity stipulated in actual volume; the *second*, according to the use, or the area to be irrigated; and the *third*, according to the time or season for which a flow was engaged. These different methods of delivery necessitated as many types of agreement, and each gave rise to its class of questions, so that legislation was demanded by which to rule in the conflicts that were brought about. And hence we find in the Sardinian code the articles which here follow, and which were the legislative outcome on the principal points of the experience theretofore had in Piedmont.

Articles of the Sardinian Code.

"Article 641. In future when an agreement shall be entered into for a constant and determined quantity of running water, and the agreeing parties shall settle between themselves the form of the outlet or structure of derivation, then that specific form only shall be retained. The parties concerned shall not be permitted to impugn its correctness on the ground either of excess or deficiency of supply, unless such difference in either way shall exceed one eighth of the quantity agreed upon; and the action shall be instituted before the expiration of three years from the time when the work was first brought into use; always excepting the case in which the increase or deficiency of water may arise from changes in the supplying canal itself, or in the volume of the water flowing in it.

"If, in the absence of any agreement for a specific form, the outlet in actual use shall have been peaceably possessed and employed for the space of ten years, no complaints regarding either excess or deficiency of water shall be entertained, excepting in the case of variations in the supplying canal, or in the course of the water flowing therein, as above specified.

"In default of any agreement regarding the form of the outlet, or of possession, the form shall be determined by the tribunals, on the judgment of professional men nominated by consent between the parties, or if they cannot agree, by the tribunals themselves.

"Article 642. When grants of water made for a specific service or object, do not express in terms the quantity granted, they shall be held to accord that volume which is necessary for the fulfillment of the said service or use. It shall be lawful for the parties interested therein to fix, at any time, the form of the outlet, and so to limit it as that the grantee shall receive the volume sufficient for the service agreed upon, but nothing more.

"When, however, the parties shall have agreed to give a definite form to the orifice of discharge or the outlet, or, in default of an agreement, there shall have been a peaceable possession of such form for the period above defined, objections to the same shall be admitted only in the cases and within the periods established in the former article.

"Article 643. In new grants of water wherein a constant quantity of running water shall be agreed upon and specified, the said quantity shall be expressed in all public acts in terms of the 'module of water.'

"The module of water is that quantity which, under simple pressure, and with a free fall, passes through a quadrilateral rectangular opening, so placed as that two of its sides shall be vertical, with a breadth of two decimetres, a height of two decimetres, and opening in a thin plate against which the water rests and is maintained, with its surface perfectly free, at a height of four decimetres above the lower edge of the opening.

"Article 644. The right to a constant supply of water exists at every moment.

"Article 645. The right to summer water *(aqua estiva)* exists from the equinox of spring to that of autumn; to winter water *(aqua jemale)* from the equinox of autumn to that of spring; and for water distributed at intervals of hours, days, weeks, months, or otherwise, for the time agreed upon or possessed.

"The distribution of water by days and nights is regulated by the natural day and night.

"The use of water on holidays is restricted to such holidays as were in legal existence at the time when the agreement was originally made, or actual possession of the water obtained.

"Article 646. In distributions of water made by horary rotation, the time necessary for the water to flow to the outlet of an employer thereof shall be included in his period of rotation; and the water which passes down the common channel at the changes of the rotation belongs to the employer with whom the rotation terminates.

"Article 647. The water which rises or leaks into the bed of the canal, subject to the distribution by rotation adverted to in the preceding article, cannot be stopped or appropriated by an employer, except at his own proper period of the rotation."

Distribution and Measurement—Italian Legislation.

The law of the present Italian government on the points of the foregoing articles from the old Sardinian code, is contained in articles 220–222, 623–626, 653, and 654, of the Italian civil code. [See appendix II.]

Remarks on Piedmontese and Italian Legislation.

Reviewing the foregoing Piedmontese articles and the corresponding legislation of the present Italian Kingdom, to be found in appendix II, we notice certain leading points bearing on each of the systems of distribution that have been mentioned, as follows:

First System—Distribution by Volume.

(*Sardinian Code, Articles 643 and 641; Italian Code, Articles 622 and 620.*)

Piedmont.—First, with respect to the delivery of water by definite volume or quantity: The Sardinian code fixed a unit of measure for general adoption, which it called a *module*, and defined it as the quantity which would be measured out under certain simple conditions specified. And it provided that in all new grants or transactions concerning the delivery of waters by quantity, the amounts *should* thereafter be expressed in terms of this legal standard. (Art. 643.)

But the delivery of water in greater or less volume than the one module, for which the dimensions and character of orifice and head of pressure were given (Art. 643), of course necessitated the adoption of openings of different sizes, and the circumstances under which water was to be delivered, likewise made necessary, in different cases, its delivery under varied heads of pressure, and hence, while the standard amount was fixed as a unit, the means of measuring out any number of such units or fractions thereof were left undetermined, and thus relegated to the field of hydraulic practice and that of agreement between the parties to the contract. (Art. 641.)

Providing for these cases, which, of course, really comprised nearly the whole practice, the law (Art. 641) left the choice of the form of the outlet of derivation to the parties to the agreement, but it held each to such choice, should the other insist, unless it could be shown that the resulting measurement was in error by an amount exceeding one eighth of the quantity contracted for. By this provision it was desired to prevent litigation over trifling amounts of water, and to promote care and insure greater accuracy in the preliminary determining of the conditions of measurement for each case. This stipulation of a margin of one eighth for error, it was thought, was made advisable by the necessarily imperfect application of hydraulic rules, in the thousands of vary-

ing forms and dimensions of structures that circumstances would compel the use of. So the results of experience were called on for a guide, and the limit of an eighth of the desired amount of flow was held to be sufficient to include the variations likely to occur.

Opinions of Giovanetti, De Buffon, and Sclopis.—M. De Buffon, in commenting on this legislation, quoted from a Piedmontese writer, who is generally referred to as having been a high authority upon these matters, and I reproduce his remarks here:

De Buffon says: "M. Giovanetti, of Novare, a lawyer specially well versed in the questions which affect irrigation, has drawn up a learned work, in which he passes in review in a comparative manner all the Piedmontese legislation on this subject. In this work he expresses, on the subject of the module of water adopted in this country, an opinion similar to the two preceding. He makes amongst others the following observations:

"'In our article 643 (Sardinian code) there are indicated perfectly the conditions of a uniform supply; but in practice there are physical circumstances which rule, and it is necessary to content oneself with the least defective or the most practicable method. The essential was to establish a unit, to sanction a result without prescribing a fixed form. The law could not make specifications upon the form (of measuring outlets). These are in the domain of hydrometry, and may vary infinitely, either in accordance with local circumstances or in accordance with the progress of art.

"'Article 641 gives to the contracting parties the express liberty of making agreements upon the form of the orifice and the structure of derivation. These are they, then, who ought to settle accounts; and if the cultivator does not know how many cubic feet of water run through an opening of fixed dimensions, he knows very well what are the advantages which he can derive from this water in practice. The seller, on his part, also makes his calculations, and he bases them on the greater or less competition, and upon all the elements of the value of the water in a given locality. These reciprocal reflections determine the contract. An outlet is not constructed until an expert, in whom both parties have confidence, goes to the place and makes a report, submitted to the examination of the interested parties.'"—[De Buffon, Vol. II, p. 192, quoting Giovanetti.

De Buffon himself, differing from Giovanetti, thought not only that a unit of measure should have been fixed at some universally recognized volume, but, also, that the form and dimensions of the outlets for a considerable range of cases should have been determined by governmental action—by a ruling of the administrative

department—and, hence, he criticised the Piedmontese law. But the reason for this shortcoming is set forth by another author whom he quotes: the count Sclopis, member of the senate of Turin, who, in a memoir communicated to the Academy of moral and political Sciences, of Turin, said:

"'The Sardinian law has held a just middle course upon this point, by having due regard to ancient customs and acquired rights. In fixing the new unit with conditions, which, if they are exactly observed, correspond to a well determined discharge, it has deemed it convenient to confine them to the two most important: that is to say, the dimensions of the orifice, and the stipulation that the water must flow through it by simple pressure.

"'Apart from these two principal conditions, it has presented nothing, either on the form of the measuring apparatus, or on the nature of the precautions to be taken to maintain the constant and uniform pressure. In doing this, it has aimed not to tie itself to the results of generalized experiences, nor to fetter the progressive march in the application of hydraulic science with the ever varying circumstances of time and locality.'"—[De Buffon, Vol. II, p. 193, quoting Sclopis.

From this we see that regard for "ancient customs and acquired rights" stood in the way of what was really the right thing to do, in the establishment of a system of water measurement for the country; and we find evidence of the difficulty of changing "ancient custom," even if it is wrong, in irrigation practice; and we note how far "regard for acquired rights" may influence or prevent legislation that it is supposed will affect such rights, even when, in truth, the effect would be to their benefit, if they were held on a just basis, and even when the proposed measures are in reality the right ones for all concerned. And we should learn, even from this small matter, how dangerous it is to allow rights to grow up, unregulated and unrecorded in intelligible form, for it will be seen later that Italy afterwards felt obliged to do in this matter what Sardinia failed to do, but what De Buffon thought should have been done years before. But, the Sardinian legislators, if not clear on the matter of water measurement, certainly understood the importance of having the extent of rights known as fully as possible, according to their unit of measure, such as it was.

Piedmont.—Taking up the next point concerning this system of "Distribution by Volume:" Experience had taught the embarrassments which arise in the management of hydraulic works,

in consequence of the long continued existence of questions open even to the extent of this small marginal limit. So, considering three years to be sufficient time in which to test the working of an outlet, the framers of this law inserted the clause barring all appeal from an agreement as to the form and dimensions of a measuring opening, when such three years from the time of commencing its use should have passed, even though the variation in the amount delivered, from the agreed upon quantity, should exceed the one eighth limit. (Article 641.)

But it was also well known that the discharges of such outlets were necessarily calculated for nearly fixed conditions in the canal of supply, and that any material variation in such conditions would produce a decided variation in these discharges, and hence it was provided that the right of appeal from an agreement concerning the form and dimensions of an opening to deliver any certain quantity of water, should hold good in all cases and for all times, should the normal flow or régime of the canal of supply at the point of the outlet be materially changed in any way. (Art. 641.) Here again the whole subject was thrown into the domain of hydrometric practice, and the courts had authority vested in them to appoint a hydraulic engineer to expert each such case which caused contention.

Lombardy.—The difficulty of dealing with acquired rights, and the way in which the best measures are put off because of the fixity of ancient customs in the practice of irrigation, is still further attested in connection with this subject of measurement of waters, by the Lombardian experience. Articles 13 and 14 of the decree of 1806 treated the matter in this way:

"Until there has been established a uniform measuring apparatus and a common unit for the gauging of waters, the construction of regulated outlets are continued to be made according to local usages. In provinces where no fixed measuring apparatus whatever is in use, the direction-general shall determine on one which must be in accordance with the local circumstances."

Now there had grown up in every one of half a dozen or more districts of this province a local system of measuring waters, and they were one and all defective, and the engineers of the country knew this and so represented it, but, local prejudice was such that, so long as Lombardy remained in this respect independent of the rest of Italy, these differences were never reconciled and

there never was any definite unit of measure adopted, although the practice became gradually better understood as the engineers succeeded in introducing better forms of apparatus and in experimenting with their results.

The Kingdom of Italy.—Attention is now asked to articles 622 and 620 of the new Italian code (see appendix II), which correspond to the articles 643 and 641 of its predecessor, the Sardinian code, upon which comments have been made. It will be seen that in these two articles the new code for all Italy follows the old code for Piedmont and other parts of northern Italy, in general principle, but differs materially in the expression of some of its details.

Article 622 of the Italian, following 643 Sardinian code, prescribes a legal "module," and makes its adoption for the future obligatory in all agreements concerning waters; but instead of defining this module only as an amount of water which would pass out of a certain orifice, with a certain pressure, it gives it a fixed and determined volume for all cases, and says "it is a body of water which flows with the constant volume of 100 litres per second," and for subdistributions it may be "divided into tenths, hundredths, and thousands." Thus after thirty years of trial the views of De Buffon, first expressed in the early part of the period, are shown to have been sound, by the Italian government doing in this particular substantially what he said the Sardinian government should have done.

Article 620 of the Italian code corresponds to article 641 of the Sardinian, and follows it quite closely in all but the clause concerning the limit of one eighth, allowable as an error in measurement before an appeal from an agreement might be taken. This clause the Italian article leaves out altogether, thus testifying to the fact that hydraulic science had in the meantime advanced so much that there was no longer any reason for any such provision: if the parties to an agreement concerning the delivery of a stipulated volume of water had the orifice for its delivery properly calculated and adjusted according to the present state of the hydraulic science, it should be correct so long as the conditions of the canal and water supply remained the same, and there should be no margin allowed, no possibility of error forecast, and no appeal from the agreement; and if they did not have the calculations and construction properly made at first they ought to

be made to stand by the agreement and structure as it was. Such appears to have been the reasoning of the framers of the new code.

Second System—Distribution by Use or Service.

(*Sardinian Code, Article 642; Italian Code, Articles 621, 653, 654.*)

The provisions thus far spoken of were for cases wherein water was to be delivered under agreement in a certain volume through a specified outlet. The second and third paragraphs of article 641 made provision for settlement of disputes arising under agreements wherein no particular form of outlet was specified, which cases could only come up under agreements made before the passage of the law under consideration, for after its passage all contracts concerning water discharges had to be drawn in terms of the standard module, and the form and dimensions of the proposed outlets were required to be written in the agreement, else it would not be legal and binding on either party.

For these cases to come up under old agreements, in consideration of the embarrassments before mentioned as resulting from the long continuance of open questions as to measurement, yet to allow ample time for their adjustment and not to bar cases of recent development, the time in which an appeal from an agreement might be taken was fixed at ten years, with, however, the reservation of right to appeal at any time, for reasons heretofore given, should a variation of discharge be occasioned by a change in the canal of supply or in its flow of water.

And, finally, this article 641, and for this class of cases wherein no agreement should have been made as to the form of outlet, distinctly provided for judicial decisions to be based on the judgment of hydraulic engineers nominated by agreement between the parties to the contest, or, if they could not agree, then wholly by the courts. The full significance of this provision becomes apparent when we know that, under other general provisions of law in Italy, the number of expert witnesses which may be summoned in a case is limited according to the character and importance of the case, and the judge has discretion to say how many such witnesses shall be admitted in all. Hence, for the cases under the above provision of the article 641, the judge having named the number of experts that might be called, the parties were allowed to agree upon them, to report as to matters of fact and scientific and practical deduction; but, should the parties to the contest fail to agree

upon the experts, the court by the law was given the power to appoint them.

This was a wise provision, growing out of a long range of experience in contests over hydraulic questions of the most complex kind. The effect was to raise the character and standing of experts in such matters. As we have seen, none but registered and proven engineers were permitted to practice the profession; and such provisions of law protected the profession from the debasing influences of the partisan rivalry between litigants. The hydraulician was made the judge of the science and art in the case, and was not permitted to appear as the partisan witness of either the one or other party to the contest, as, unfortunately, is the case in our American system of experting. To conduct such cases there were lawyers trained in physical science and hydraulics, called *engineer advocates*. The civil engineers were (and still are in such matters in all Italy) the court referees and advisers for all scientific matters of fact and opinion.

Piedmont.—Passing on to article 642, we find here certain provisions relative to the cases wherein water is delivered under the second arrangement—that according to its use or service, or the area to be irrigated. The law provided for this case that when an agreement had been made for water to perform any certain service, as for instance the irrigation of any specified crop or determined area of land, and meaning for one irrigation, or more, or for one season or year, or more, as the case might be, then the contractor should be obliged to deliver that quantity of water necessary for the purpose. And, in case of contests coming up on this point, this quantity was in practice determined, according to the facts and the results of experiences in point, by the courts, upon the evidence of experts chosen by the parties to the suit, as might be allowed by the court, or by the court itself if no amicable agreement could be arrived at. But to avoid the precipitation of contests on this point before the courts, the law provided for an amicable adjustment of disputes by the fixing of an outlet such "that the grantee shall receive the volume sufficient for the service agreed upon, but nothing more."

After what has been said in commenting upon article 641, the second paragraph of article 642 does not call for remark. It is apparent also that all the provisions of article 642 were intended for cases that would arise under agreements made before the pas-

sage of the law, for, as we have seen, after its passage only the one form or arrangement for delivery—that according to actual volume expressed in terms of the standard module—was to be considered lawful.

The Kingdom of Italy.—Article 621 of the Italian code (see appendix II) corresponds to that (642) of the Sardinian last commented upon, and follows it closely in meaning, although not in wording, with one exception—that the limit of time during which an agreement may be appealed from when the works for an outlet shall have been peaceably used as built, is reduced from ten to five years. On this point of distribution by use or service rendered, the Italian code contains a very important provision not found in the old code for Piedmont. It is embodied in articles 653 and 654, and is to the effect that when an agreement has been entered into to furnish water to irrigate any certain area of land or any certain cultivation, or for any fixed purpose, with a stipulation that the drainage waters shall belong to the party delivering the supply, then the user of the water cannot change its use in a way to consume more or reduce the drainage waters in volume. The reason for this rule is apparent when we know that, for instance, on the same area of land some crops would require and absorb twice as much water as others, the method of applying the water being in each case suited to the cultivation.

And, furthermore, the additional matter in the new code provides that the user of the water cannot divert and use again any portion of the drainage waters escaping from the place of his use of the water agreed for, on the plea of having increased the supply in any way. If he has obtained water under an agreement for any expressed purpose with the stipulation that the drainage water is to belong and be at the disposal of the owner or controller of the supply with whom he has contracted, then he must refrain from using the water for any purpose than the one named in the agreement, and must let all the drainage waters flow off as they naturally would, or as agreed upon, whether increased from any other source of supply or not. This provision, holding a user of water to the strict letter of his agreement, has doubtless been made necessary in order to avoid contests wherein the facts for evidence—as to increase of supply and drainage from other causes or sources than the one agreed for—may be very obscure and difficult of substantiation one way or the other; and it has the effect of

making the wording of agreements more explicit, in order to cover all contingencies of practice in each case.

The then following articles (655 and 656) of the Italian code do not refer to waters furnished under agreements, but to those to which a right has been attached as a servitude, and, hence, they will be spoken of elsewhere.

Third System—Distribution by Time.

(*Sardinian Code, Articles 644 to 647; Italian Code, Articles 623 to 626.*)

The arrangements for delivery of water by actual quantity and by service to be rendered, having now been spoken of, we come to the provisions of the law, relating to the delivery of water by agreement as to *time*. In northern Italy irrigation goes on the year round, and, in fact, the most copious irrigations are conducted through the winter, although at that season the sky is much overcast, rain, or sleet rather, frequently falls, snow is not uncommon, so that the upper part of the valley of the Po is covered for weeks at a time with a snow mantle a foot or more in depth, and standing waters are frozen to several inches in thickness.

The irrigation at this season of the year is that of meadows, or *marcite* fields as they are called, and it is a practice of a high order in the art. The object is to provide green food for the cows of the dairy farms with which the country abounds, and for which it is remarkable, supplying immense quantities of cheese and butter for export. These meadows are formed after very exact plans, so that their surfaces are shaped into long narrow ridges parallel to each other and of such longitudinal and transverse slopes that the waters applied through a ditch situated along the crest of each ridge, spread out from it laterally, flow in a thin sheet down each slope of the ridge over and through the grass there growing, and find exit longitudinally by way of drainage ditches lying between each two such irrigation ridges.

Thus in the coldest weather, with snow a foot deep elsewhere, the surfaces of these meadows are kept clear by the slowly moving film of water over them; the ground is prevented from freezing, and the grass, kept green and growing, is cut from time to time and fed in stables to the cattle. The waters of springs, or *fontanili*, with which these lands abound, as elsewhere explained, being much warmer, are preferred to the canal waters for this purpose of winter irrigation, and command high prices at this season,

as indeed do other waters as well, in some localities. Thus it is that there is a distinct practice following through a stated season, known as winter irrigation. As in other countries, so, of course, in northern Italy, the season of ordinary summer irrigation is well marked by the climate and the requirements of the soils and the crops cultivated, and, thus, it comes about that waters are contracted for in certain streams of flow or amounts, as "summer waters" and as "winter waters," meaning for the seasons of summer and winter irrigation, respectively.

Again, irrigation is conducted day and night, the twenty-four hours around, summer and winter. Some persons contracting perhaps for the use of water only in the daytime, others for its flow at night; and hence the expressions "day water" and "night water." And, in the way of explanation of the technology of the articles of the code upon which comment is to follow: finally, agreements are made for water to be distributed amongst consumers by certain hours of flow to each in rotation; and hence the expression "horary rotation."

Thus with respect to *time* there are arrangements (1) for summer waters, (2) for winter waters, (3) for day waters, (4) for night waters, and (5) for hourly waters; and to guide or prevent the contests which might arise under agreements for such waters, the Piedmontese (Sardinian) code contained the provisions found in the articles, 644, 645, 646, and 647, heretofore transcribed.

Piedmont.—And now, annotating these rules, we find in article 644, a declaration as to the rights, when an agreement had been entered into to deliver any certain "flow of water" for any definite or indefinite period of time, to the effect that so long, and for every moment, as the time extended, the right to the flow existed: unless there had been a reservation in the agreement, whereby the flow might be checked at some time, the obligation to deliver continuously under this form of arrangement had been incurred, and this article recognized it.

Passing to article 645, concerning summer and winter waters, etc., after what has been said by way of introduction to these rules, no comment is necessary here; except to call attention to the fact that the law carefully defined the application of these terms, thereby removing much cause for misunderstanding of agreements.

Article 646 treated of a point which had given rise to much dis-

pute—the question as to whom the tail end of a water supply belonged, when, after the stipulated hour for change had arrived, the stream was to be switched off on to the property of another user. For instance, time is kept, at the head of a branch canal, for distributing, by schedule, a certain stream of water to different users of it in irrigation. The consumer has a right to it for two hours, or any other stated time, and the question is: to whom does the water belong which is in the ditch, on the way down, when the gate is closed at the head of the ditch, at the end of the time of the turn. This flow is called by the Piedmontese the "tail of the water" *(coda dell' acqua)*, and the article now under consideration said that it belonged to the consumer who last had the use of the stream. On this subject, Baird Smith wrote:

"Until this point was settled by the code, it was occasionally in dispute, whether the loss of time due to the passage of the water from the canal of supply to the distributing gates to the different employers, should be borne by the proprietor of the canal or by the consumers; it is established as a general rule that, when the water passes below the outlet of the common channel, any loss of time that may arise shall affect the employers only, being borne by each in proportion to his distance from the head, or from the outlet of the field which precedes his in the order of the rotation." —[Smith, Vol. II, p. 288.

It has been elsewhere remarked, that much of the irrigated regions of the valley of the Po is underlaid with water-bearing strata of gravel, and that the cutting of canals through them often opens sources of additional water supply to these channels. It is not infrequently the case that such sources yield a very material part of the volume carried by a canal, and that, hence, it has a considerably greater amount of water at a lower than at a higher part of its course; or that, being a distributing channel, when the water is shut off at its head, it still continued to have a flow derived from springs in its bottom. The right to use these waters was a subject of contention: employers below claiming that they did not belong to the canal or ditch owners. So, as the result of these contentions, came decisions of courts, which were incorporated into the code in article 647: the waters rising in or leaking into a canal or ditch were held to belong to its owner; and employers below could not use them except at their proper hours and as part of the stream delivered to them in distribution.

The Kingdom of Italy.—Articles 623 to 626 (see appendix II) of

the new Italian code correspond to those of the former Sardinian code, last commented upon, and follow them in principle and terms so closely that a comparison of details is not called for.

In closing some comments on article 647 of the Sardinian code, Baird Smith, writing in 1855, said:

"It is not uncommon in the irrigated districts of Piedmont and Lombardy for parties to make mutual interchanges of their periods of rotation. Special cases arise in which water is wanted at special times by individuals not possessed of the right to irrigate at such times. They, therefore, effect an exchange of period with other parties, to whom an arrangement of the kind may be convenient, and, though the law is doubtful on the point—some decisions being in favor of, and others against, this proceeding—there does not appear to be any valid objection to its use, if it be guarded by the provision that the other employers of the water-course[1] shall sustain no serious damage by the manner in which it is carried into effect. An analogous custom is common in India: the positions of outlets on water-courses, held in common, are often changed, and so long as other parties do not suffer by this, the interests of agriculture are certainly promoted by its being freely made use of."—Smith, Vol. II, p. 290.

As may be inferred from the above, there was no provision in the Sardinian code, on this point, but now we find in the Italian code—the outcome of longer experience—an article which covers the case, as follows:

"Article 627. In the same canals the users may vary or exchange their turns among themselves, provided such changes cause no injury to others."

Probably the author, Smith, was aware of decisions already made at the time of his investigation and upon which this provision of the later code was afterwards predicated; but, even so, it is an evidence of close study of his subject that the rule was afterwards enacted into law as nearly as possible in the words in which he said it should exist.

[1] Distributing ditches are called "water-courses" by the English writers on irrigation.

SECTION II.

The Rights of Irrigators.

(1) The Continuance of Water Supply.[1]

In Italy, as in irrigating countries generally, where there has been a clashing of interests between the owners of canals, or holders of great water privileges, and the irrigators to whom the waters were to be distributed, special points came up in this connection. Many water-rights were established there by grant and prescription, in times when from a troubled condition of society, no thought was had of future agricultural masses of people with interests to be protected. A water-right aristocracy grew up; the canal owners claimed the right of absolute property in the water held by them, and undertook to do with it as they chose. If they could get higher rents for it in one section of country commanded by their canals than in another, which was occasionally the case, they claimed the right to discontinue the supplying of irrigators where water was cheap, after their annual or term agreement had been fulfilled, and of leading it to the lands of those who would pay more for it. On the other hand, the irrigators claimed that they had expended their means and labor in the building of distributing works and preparation of lands to receive these waters, and being deprived of their supply was equivalent to being debarred the use of their property. They claimed that water-rights were not rights of property in the waters, as in the sense of ownership of land; that the grants were made for the good of the country and not for the exclusive benefit of the grantees.

Piedmont.—In Piedmont, these questions long ago came to a head from time to time in great struggles between immensely wealthy and powerful interests, but it was only during the last years of the last century and the first years of this, that they were well disposed of on principle. The courts and senates rejected the claim of absolute ownership and ultimate right of control set up by the water-right grantees and canal men, and recognized the right of irrigators to the continued use of waters which they had for a considerable time had at their disposal, and to use which

[1] See, Smith, Vol. II, pp. 138 and 261; also, De Buffon, Vol. II, pp. 210–212, and elsewhere.

they had constructed distributing works and prepared their lands; and several of the local senates decided that so long as the irrigator paid the water-rates, he could not be deprived of the use of the waters, and that a change in water-rates had to be fixed by arbitrators, appointed by both parties at interest.

This was the law in Piedmont before the various petty governments were set aside during the early part of this century, in the consolidation of the kingdom of Sardinia. When the commission was forming the Sardinian code, an article carrying out this principle was embodied in its draft, and agreed to by all of the local ruling interests to be reconciled but the senate of Genoa, a locality where irrigation was not practiced. Here it was insisted that the right sought to be established was subversive of the rights of property; so the article was stricken out of the draft of the code. But it was subsequently held that the rule had been established and recognized for all existing irrigations, so that these were protected, notwithstanding the failure to incorporate the article in the code; and projectors of new irrigations have protected themselves by securing long term leases on waters before preparing their lands. The canal and water-right owners have apparently recognized the situation and dropped the conflict, for at the time Baird Smith wrote, any landed proprietor could "obtain a lease of a given quantity of water, either in perpetuity or for a specified term, on paying the current price for it."

Lombardy.—In Lombardy, also, this question came up in a most aggravated form. The holders of water rights "acted on the principle that they had a right to do what they liked with their own, and were in the habit of suspending arbitrarily the supplies of water disposed of by them to other parties under subordinate grants, of increasing as they thought fit the prices to be paid, and, in a word, of pushing to its utmost limits the right of absolute property purchased by them from the state." As the outcome of a long series of struggles over this point, the question was settled very much as already described for Piedmont: the water-right holders were restricted in the operation of their rights of property-ship in the waters, and compelled to distribute them amongst the irrigators according to ancient custom, notwithstanding the fact that in most cases of the older rights, they held the water as an absolute property by virtue of purchase from government. Baird

Smith wrote, of this claim of the water-right owners in Lombardy to do as they chose, as follows:

"But an agriculture founded on artificial irrigation cannot advance as it ought to, under such an arbitrary system; and so, in protecting the irrigating communities, there gradually grew up a right, which, being acknowledged by the legislative tribunals, modified the despotism of the government grantees. This right bears the name of the *diritto d'insistenza*, and assures to a province, or commune, or association of irrigators, or even to individuals, a legal claim to a continuance of such a supply of water as they may have enjoyed for long periods of time, and on the faith of possessing which they may have incurred heavy expenses. So long as the irrigating community pays the water-rent fixed by the grantee of the canal, it cannot be arbitrarily dispossessed of its supply; and in the event of the proprietor of the water desiring to change the rates of payment, this must be done through the medium of arbitrators duly nominated by both parties."—[Smith, Vol. II, p. 138.

It is as a result of this class of troubles that we find all agreements between those who have water to distribute, sell, or lease for irrigation, whether the government, private individuals, or great corporations, and those who use the waters, are made for long terms, the minimum, as a general rule, being nine years, and, for greater volumes, twenty or thirty years, and, not infrequently, for ninety or an hundred, or in perpetuity. These contracts determine in detail the terms of the transaction, and are recorded and stamped, even though for an insignificant amount only. Their form and provisions will be spoken of elsewhere.

(2) The Use of Spare Waters.[1]

We now come to another class of contests between those who held the water, and those who wanted to use it. The case we have just considered is one wherein water having been used in irrigation by certain employers of it, under leases or rents, at a determined rate for considerable periods of time, the owner of the canal of supply desires to raise the rent at the end of a lease, or dispose of the water to other persons, thereby leaving his former customer without a supply. The present case is that in which an owner of a spring, or canal of supply, not having use for all the water himself, refuses to sell it to any one at a fair rate, but insists

[1] See, Smith, Vol. II, pp. 257–260, and elsewhere; also, De Buffon, Vol. II, pp. 200–204, and elsewhere.

upon wasting it. One would suppose that such cases, in a country where water is so valuable, would never occur, but there have been some remarkable instances of this kind of abuse, which are so instructive that I reproduce an account of one of them here, as given by De Buffon, upon the authority of count Cavour, who was minister of finance of the Sardinian government. In his manuscript notes to De Buffon the count said:

"I have seen an example of each of the abuses that the new code has tried to prevent. Here is one of them:

"In 1832 the marquis of Saint-G——, farmer,[1] of the canals of the Vercellais, having quarreled with the marquis Pal——, his neighbor, had persisted, during eight consecutive years, in throwing away into the Po, two streams of water that the marquis Pal—— offered to pay him 12,000 francs ($2,400) a year for. To satisfy a personal antipathy M. de Saint-G—— consented to lose nearly 100,000 francs ($20,000), and to cause at the same time to the agriculture of his country a loss at least three times as great.

"The new code put an end to this deplorable state of affairs; but a sentence of the senate of Turin, founded on article 560 of it, was necessary in order to force M. Saint-G—— to have his revenue augmented by 12,000 francs a year.

"This same marquis of Saint-G——, wishing to coerce the community of F——, to subscribe to an engagement, which they thought oppressive, refused during two years to let run on the lands of this community the *colatures*[2] of his vast domains, for which he was offered 6,000 francs per annum. He preferred to waste them into the Po.

"Marquises of Saint-G—— are rare, but as they are not impossible, the law does well in taking away from them the means of injuring people less rich and powerful."—[De Buffon, Vol. II, pp. 203–204, quoting Cavour.

Piedmont.—The provisions of the law to which the count referred were contained in the article of the Sardinian code, which here follows:

"Article 560. Every proprietor or possessor of water may make such use of the same for himself as may seem to him good, or he may dispose of it in favor of other parties, provided always that no title or prescription exists to the contrary; but after having used the water himself, he is not at liberty so to dispose of it as to cause it to be lost, to the injury of lands at lower levels, which might have benefited by it without causing any back-water, or

[1] The system of farming out the revenues of and distribution of the water from government canals is explained elsewhere; and the abuses which have grown up under it have been shown. The present is a case in point, illustrating what has been said.

[2] The waste waters from meadows and rice irrigations.

injuries of other kinds to the higher employers. Whoever may desire to avail himself of the water referred to is bound to pay a fair price for it, whether the supply be derived from a spring existing in the upper estate, or from a stream introduced by special grant."

It will be seen that the provisions of this article meet the case quite fully, and, as a matter of fact, the contentions on points of this class were stopped by a few decisions of the higher courts, under it. Mr. Baird Smith, from a former edition of De Buffon's work, also noticed Cavour's account of the case of the Marquis of Saint-G——, and, in concluding the topic, himself made the following remarks:

"I think few will dissent from M. de Cavour's conclusion; for if it is ever necessary that a man should not have full power to do what he likes with his own, or that the duties of property should be enforced equally with its rights, surely it is when the very sources of agricultural progress are concerned. I think, therefore, that the principle of requiring every proprietor of water to place it at the disposal of his neighbors on equitable terms, after his own wants have been fully supplied, is one of great importance in the legislation of irrigation, and well worthy of adoption by us in the East, where great canals are in progress."[1]—[Smith, Vol. II, p. 258.

The Kingdom of Italy.—In framing the new Italian code (see appendix II), article 545, the above article (560) of the Sardinian was closely followed, so that irrigators have now the same consideration on this point, for all Italy, that those of Piedmont had twenty and more years ago. But, also following the framers of the old code, those who made the new refrained from inserting any clause corresponding to the ancient *diritto d'insistenza* of Piedmont and Lombardy—the right whereby any water company could be compelled, by judicial action, to continue the serving of its old customers, and be prevented from conducting its waters to other customers, thereby leaving users of water of long standing without any. As before remarked, the law on this point was set for existing irrigations by the action of the local senates in the last part of the last and the first part of this century; and after the adoption of the Sardinian code new irrigation agreements have always contained a clause protecting the irrigators for long periods, from possible withdrawal of their water supply.

[1] Mr. Baird Smith's report was written for the English East India Company, operating in India.

SECTION III.

Obligations and Rights of Irrigators and Canal Men.

(1) Obligations Concerning Water Supply and Use.

Experience teaches that the relations between those who command for distribution, the water supply of an irrigation region, and those who receive and use it, cannot be too clearly understood. The scale of efficiency of canal works and of energy in their management is such that, at best, it is in practice very hard, in any particular case not at an extreme, to say whether a management has been to blame or not for a failure of water supply. A canal manager may be so often a target for ungrounded fault-finding on the part of irrigators, that he is hardened to their complaints, and becomes careless of their interests; or he may be parsimonious in the business administration of his property, his canal works become inefficient, or, not repaired in time for the season of rising waters, are damaged, and the irrigators suffer because of short supply resulting from his neglect or bad management.

On the other hand, a failure of water may be occasioned to irrigators, by reason of circumstances beyond the control of the contractor for the supply; the streams may not bring down their accustomed quantity, or the works may be damaged by unexpected and overwhelming floods, so as to cause delay in delivery of waters for irrigation; or third parties may maliciously or through neglect cause damage to works, or otherwise interrupt the water supply. The questions growing out of the relations here spoken of, were found, in northern Italy, to specially demand the establishment of general guiding rules, and accordingly we find such provisions in the laws of the country, as seem to fully meet the more important points for misunderstanding, likely to come up.

Piedmont.—In Piedmont the Sardinian code was quite explicit on these relations. The obligations of those who had water to distribute to customers, for irrigation, concerning their duties with respect to delivery of the supply engaged, the conditions whereunder they were not to be held responsible should there be a deficiency in the water delivered, the stipulation as to a rebate on the water-rate in the event of certain conditions being presented, the recourse of recovery for damages, and stipulation as to who should

join in an action therefor, are fully and so clearly set forth in articles 664 and 665 of this code that I present them without further remark:

"Article 664. In default of special agreements the proprietor or other granter of water from a spring or canal is under obligations to those who hold grants under him, to execute all the ordinary and extraordinary works required to procure the supply; to conduct and to preserve the water up to the points at which the employers take possession thereof; to maintain the structures in an efficient state; to repair the bed and banks of the spring or canal; to effect the usual clearances; and to exercise due diligence, watchfulness, and care to insure the delivery of the water, and its regular supply at the appropriate times, under pain of having to pay compensation for all injuries inflicted on the employers of the water by his neglect of duty.

"Article 665. If, however, the granter of the water can prove that the deficiency of the supply arose from natural causes, or from the acts of others, for which he could not be held responsible, either directly or indirectly, he shall not, in such cases, be bound to pay compensation for the injuries sustained by the users of the water, but only to submit to a proportional diminution of the amount of water rent, or the equivalent corresponding thereto, whether previously paid or not, without prejudice to the right of the injured parties to institute an action for compensation against those who may have caused the deficiency.

"In the second case contemplated above the granter of the water is bound to join in the action with the employers, should they so desire, and to use every means in his power to assist them in obtaining compensation from those who had caused the deficiency of water."

The Kingdom of Italy.—Articles 649 and 650 of the Italian code (see appendix II) correspond to the foregoing, numbers 664 and 665 of the old Sardinian code, and are the same with one important exception. The penalty which was to be imposed upon the contractor to deliver water, for non-fulfillment of agreement, as embodied at the end of article 664 of the Sardinian code, is not reproduced in the Italian. It may be, however, that other general laws of the country regarding contracts, or agreements, or other cognate matters in principle, amply cover the case, and enable the employer of the water to recover compensation for damages from the contractor to deliver it, should injury result from his neglect.

In this connection, although noticed before, under the heading of "Distribution by use or service rendered," articles 653 and 654 of the Italian code are worthy of mention, as imposing an obliga-

tion on the user of water not to change in any way its use, so as to affect the volume required, or the amount of drainage waters left over when the water is furnished under an agreement to do a certain service, and with a clause reserving the right to the drainage waters, even though a plea is advanced that the volume of the drainage waters has been increased from some other source. Thus, water being furnished to irrigate a certain tract of land in a certain crop, under an agreement whereby the drainage waters were reserved by the party furnishing the supply, even though the irrigator should introduce a new and additional supply on to an adjacent tract, lying higher, and thereby increase the amount of drainage from the lower estate, he cannot use any part of said drainage, but must let it flow for the benefit of the party to whose benefit the reservation in the agreement has been made. The apparent reason for this rule, being given in another place, will not be repeated here. It would seem, however, that nothing could prevent an agreement being made whereunder an irrigator would be fully protected in the use of any addition which he might cause to the drainage waters.

(2) Priority of Privilege in Distribution.

Principles strenuously contended for and contested, at one time or another in all irrigation regions, are those of priority of rights to water: first, by virtue of commanding localities on streams; second, because of antedate of claim; and third, because of contemporaneous advantage or stated claim for a definite time. In the legislation of northern Italy these principles not only found recognition in the adjustment of rights to water from natural streams, but in the arrangement of the generalities of distribution from canals to consumers.

Piedmont.—This last application was a feature peculiar to Piedmontese legislation, and found place in the Sardinian code, in articles 666 and 667, some points of which are worthy of explanation and remark.

Generally, the management of irrigation is such in Italy that, whether water is delivered by volume, as per module, or according to the use or duty assigned, or indeed, in all cases except when a continuous stream has been contracted for, the periods for each delivery are determined and adjusted in a schedule long beforehand, perhaps at the beginning of the season, on each canal.

The same outlets, the same ditches, may, at different parts of the year, different months, different days, or different hours, serve different people, but it is known and recorded long beforehand at what times each is to receive his supply. This being the case, and the schedule being determined, should the water supply be all engaged, and should, at any time, from any cause, a deficiency occur, as by the breaking of a canal or temporary derangement of any work, the loss of water had to be borne by the parties whose turn it was to receive it, according to the schedule. They did not have to pay for water which they did not get, but there being no water, or a short supply, during the hours, days, or weeks, as the case may be, for which their turn was set, they were the sole losers so far as the effect of slack supply was concerned. They could not be served with water at expense to the shares of other consumers who had been booked for other hours, or receive water at any other time, unless there was a surplus of supply over the demand at some period, which could be turned to them. (See article 666.)

In cases wherein water was not distributed by turns, but in a continuous stream, another rule prevailed. Primarily, the principle of "first in time first in right" was applied: he whose engagement or agreement for water was the oldest, received his full supply so long as water lasted, while those whose contracts had been made more recently had to suffer loss by the deficiency; and so on down the scale as to time—the last one being the first sufferer.

Then came in the principle of advantage by reason of situation. Where privileges were of even date in origin, the one located highest on the canal of supply had the advantage to the full extent of its quota, while the ones below, commencing with the furthest from the head, had first to suffer reduction when the supply was short. But, as will be noticed in the law, no one was expected to pay for water which he did not get, and, if payment had been made in advance, the irrigator had a right to reclamation for the amount. (See article 667.)

These articles are now themselves transcribed for closer study:

"Article 666. The deficiency of water shall be borne by those parties during whose period of rotation the said deficiency may occur; saving their right to compensation for injuries, to diminution of water-rent, or its equivalent as above defined.

"Article 667. Among the different employers, those individuals

whose titles or rights of possession are most recent, shall first bear the effects of the deficiency of the supply. Among employers equal in the preceding respects, the deficiency shall first affect those whose outlets are at the lowest levels; saving, in all cases, the right of action for compensation against the parties causing the deficiency."

The Kingdom of Italy.—Articles 651 and 652 of the Italian code (see appendix II) correspond with the foregoing, numbers 666 and 667 of the Sardinian code, and closely follow them with one exception.

The second clause of article 652 differs from that of 667, in that the expression does not clearly indicate that the principle of priority by reason of situation on a stream is to be applied.

AUTHORITIES FOR CHAPTER XI.

De Buffon.—[Work cited as an authority for Chapter IX.] See, Vol. II, B. VII, Ch. XXXVIII, Div. II, and Div. IV; Ch. XXXIX, Div. II; Ch. XL, Div. I; and elsewhere as cited.

Smith.—[Work cited as authority for Chapter IX.] See, Vol. II, P. III, Ch. I, Secs. 1, 2, 3, 4, and 5, and Ch. II; P. IV, Ch. I, Sec. 3, and Ch. II, Sec. 3; and elsewhere as cited.

Sardinian Code.—[Work cited as an authority for Chapter X.] See, Articles 560, 641, 642, 643, 644, 645, 646, 647, 664, 665, 666, and 667.

Italian Code.—[Work cited as an authority for Chapter X.] See, Articles 545, 620, 621, 622, 623, 624, 625, 626, 627, 649, 650, 651, 652, 653, and 654; and also the annotations to each of these articles.

CHAPTER XII.—ITALY[4];

REGULATION OF DRAINAGE AND WORKS CONNECTED WITH IRRIGATION PRACTICE.

SECTION I.—*Regulation of Works.*
Construction of Works on Private Lands.
Distances from Boundaries of Estates.
Maintenance of Works—Free Passage.

SECTION II.—*Rights and Obligations of Drainage.*
Drainage Complications.
Principles of the Italian Laws.
Provisions of the Codes—Sardinian; Italian.

SECTION III.—*Sanitary Legislation.*
The Unheeded Teachings of Experience.
Sanitary Effect of Unregulated Irrigation.
Regulation of Rice and Meadow Culture.
Sanitary Regulations—Modern Legislation.

SECTION I.

REGULATION OF WORKS ACCESSORY TO IRRIGATION PRACTICE.

Distances to be Preserved from Boundaries.

In irrigation regions closely settled and fully developed, questions frequently come before the courts which are rarely, if ever, met with in other countries, and thus arise necessities for provisions of statutory law which would be altogether needless elsewhere. Prominent amongst these questions are those relating to the rights of individuals to do as they please with their own property or on their own lands. The class of operations accompanying or forming a part of irrigation practice, are peculiarly of a character whose effects are not and cannot always be confined to the possessions of those who carry them out. Indeed, the more important works must necessarily be community works; in nearly all there is a community of interest or a widespread effect, and even works for

one's own benefit, solely, on one's own property, not infrequently infringe upon the rights of one's neighbors to an extent that renders it necessary to impose restraint on the acts of individuals in exercising their rights of propertyship. Instances of this class of legislation have already been cited in former chapters of this report; notably under the headings concerning springs, and water-rights, wherein the right to excavate, bore, or dig for water on one's own property is limited by law out of consideration for the rights of others having springs, wells, or water supply works on adjoining lands.

We now come to certain provisions of law which limit the right of individuals to construct canals and ditches for conducting waters, on their own property. A moment's consideration shows the necessity for the restrictions. The reasons may be summarized as follows:

When canals or sources of supply are situated, as often they necessarily are, near the boundaries of the tract on which they lie (and which perhaps may be a narrow strip condemned, on which to construct the work only), by reason of the permeable nature of soils or subsoils, if parties owning the adjoining lands were allowed to excavate a parallel work as close to the border of their lands as they chose, the waters of the canal or source adjoining might thus be caused to percolate away into the new excavation, perhaps at a lower level, to the great injury of him or they who own the source which has produced, or canal which has brought them. Or, by reason of the instability of the soil itself, if persons were permitted to excavate as closely as they chose to a boundary of their lands, the ground itself might be caused to cave away from a canal bed or bank, fountain, or basin in adjoining lands, to the great loss of its owner. And, again, canals used for carrying waters, liable to the erosive effects of their currents, if constructed close to the bounds of one estate, may cut in upon the lands of others, to their injury; or, being in porous soil, impart undesired moisture to the lands of others, thus rendering them unfit for cultivation. As a consequence of experiences of such effects, we find in the laws of northern Italy a number of provisions intended to meet these cases, or to prevent the causes of such conflicts.

Piedmont.—Amongst the provisions spoken of are the following articles, of the Sardinian code formerly ruling in Piedmont,

which, after the foregoing introduction, so far as our subject goes, require no further explanation:

"Article 599. The ditches and canals which the proprietor of an estate may excavate on his own land, shall be placed at a distance from the boundary lines of adjoining estates at least equal to their respective depths, except in cases where local regulations prescribe a greater distance.

"Article 600. The foresaid distance shall be measured from the edge of the bank of the ditches or canals nearest the boundary lines above referred to. This bank must always have a slope equal to its height, or, in the absence of such a slope, it ought to be provided with retaining works.

"Where the boundary of an estate is formed by a ditch possessed in common, or by a private road also common, or subject to the servitude of passage, the distance shall be measured from the crest of the bank, as above defined, to the edge, of either the common ditch or road, nearest to the property of the party desirous of excavating the new canal or ditch; the obligations regarding the slope or revetment of the channel, remaining in full force.

"Article 601. Should the ditch or canal be excavated in the vicinity of a wall possessed in common, the observance of the foregoing distance is not necessary, but the party excavating the said ditch or canal shall be bound to construct all such intermediate works as may be necessary for the protection of the wall."

It will be noticed that these rulings simply prescribe minimum distances to be observed in the location of works. In the judgment of the courts as advised by professional experts, in each case a greater distance might have been insisted upon, or other precautions enforced, as was indeed frequently the outcome in practice.

The Kingdom of Italy.—Articles 575, 576, and 577, of the Italian code (see appendix II), follow closely the foregoing numbers 599, 600, and 601 of the old Sardinian code in wording as well as meaning; there being only a slight difference in the framing of the second one of the three, which really does not materially change the meaning, except that the degree of slope required to the bank of a ditch when adjoining a property line is not determined in the new law, as it was in the old; thus leaving this matter of detail to administrative regulation or judicial decision.

Obligation as to Construction and Maintenance of Work.

A very important ruling, in the way of a regulation for the construction and maintenance of canal works, was embodied in the

Piedmontese law, in the form of an obligation upon the owner of any ditch, canal, or water-course, to so plan, lay out, construct, and maintain it, that neither the work itself nor the flow of its water, should interfere with the free passage of travel on public or private roads or paths, nor with the free flow of waters in and efficiency of other canals or ditches, whether for irrigation or drainage purposes.

Piedmont.—This provision was made in article 633 of the Sardinian code, which was as follows:

"Article 633. In cases where waters flowing for the benefit of individuals prevent the adjoining proprietors from passing freely to their estates, or check the circulation of water in other irrigation or drainage lines, the parties benefiting by the waters are bound to construct and maintain in good order the bridges necessary for intercommunication, in a sure and convenient manner. They are farther bound to construct and maintain such culverts, aqueducts, and other like works, as are required for the free progress of irrigation or drainage, saving an agreement or legitimate title to the contrary."

The Kingdom of Italy.—In framing the new code for Italy, the old Sardinian ruling was closely followed in this particular, as will be seen from article 608 of the Italian code. [See appendix II.]

SECTION II.

The Rights and Obligations of Drainage.

Drainage Troubles in Italy.

More than in France, Spain, or any other country where irrigation has been broadly practiced, in northern Italy the problems of drainage have been ever present in the practical, legislative, and administrative complications which have been developed by it. This has been quite naturally brought about: for irrigated northern Italy is a well watered country, both with respect to the number and volume of streams, which course from the adjoining mountains across its plains, sometimes producing widespread and disastrous floods even in the irrigated districts, and also in the amount and regularity of its rainfall. And not only is the country thus well supplied with water by the streams from the moun-

tains, and directly by the rains from the sky, but its subsoils abound with flowing waters which break forth in many living springs thickly scattered over wide regions of its plains. Irrigation without drainage, and systematic and thorough drainage too, in northern Italy, would very soon result over the whole country in disaster: financial failure in agriculture, and a general depopulation of the country, because of its unhealthfulness. Drainage, then, is not only an essential to individual success in irrigated cultivations, but it is a requisite to the maintenance of the health of populations, and hence we find that it has received very close attention not only as an art, but as a social and political problem.

And still again, in most cases, the waters of drainage are not carried to waste—they are property, valuable for the irrigation of other lands, and almost as much in demand for the purpose as are those of springs or rivers. Authorities unite on this point, and so, for present illustration, I cite only one. Baird Smith says:

"As the necessary complement to an effective system of irrigation, arrangements for disposing of the drainage-waters connected with it are essential. It will, I believe, be found in most cases, and I know from experience it is especially so in northern India, that imperfections of local drainage, as connected not so much with the great topographical features of the country, as simply with irrigation itself, within the limited area it affects, are more frequently the source of malaria and injury to the land than anything else."—[Smith, Vol. II, p. 300.

In another place, speaking of troubles in the irrigation regions of India, this same author has written: "A comprehensive and authoritative system of drainage in connection with irrigation must be matured, and duly sanctioned by government, before the existing evils can be wholly eradicated."—[Smith, Vol. II, p. 303.

Principles of the Laws.

Piedmont.—The civil code which ruled in Piedmont contained some very important provisions relative to rights and obligations connected with drainage, yet there was much by way of regulation of private and public works, and the acts of individuals governing and affecting drainage matters, that was left to the discretion of the administrative authorities in the execution of their general police power.

We find in the code express provisions on the following points: *(a)* The right of natural drainage-way, which assured to the owner

of lands the continuation of the privilege to have waters, draining naturally from his estate, flow off on to lands below, as they by nature were accustomed to flow, even though they injured the properties lying there. But this right was accompanied by a stipulation that such waters were not to be increased artificially; and at the same time by a prohibition upon the owner of the lower lands not to interfere with their flow. (See article 551.) *(b)* An obligation upon the proprietors of lands where were situated channels or embankments serving for or necessary to the preservation of efficient drainage, to keep such works in repair. *(c)* An obligation on these proprietors to construct new or additional works, such as might be necessary for the preservation or protection of the existing structures, channels, or banks. *(d)* An obligation on all land proprietors to keep the water-courses and channels through their estates clear from such deposits or accumulations of material as might interfere with the free escape of the waters, and thereby cause damage to their neighbors. *(e)* The right of interested parties, suffering or threatened in their estates with damage by reason of the necessity for repairs to works, the removal of deposits or clearance of channels, situated on others' lands, to go on to such lands, and themselves make the repairs, removals, or clearances. *(f)* The right of the party thus in peril by reason of the necessity for additional protective or other works, to go on the lands of another and there construct them. (See articles 552, 553.) *(g)* An obligation upon all land proprietors interested in the maintenance of channels and embankments, or the preservation of free escape for drainage waters, to contribute in proportion to the extent of their interests, towards the expense of such maintenance and clearances. *(h)* The individual right of proprietors interested in such works and channels to proceed for the recovery of damage resulting to them by injury to the works, or by obstructions made or caused to form in the channels, against the party, or parties, causing such injury or formation. (See article 554.)

But the rights *(e)* and *(f)* were accompanied by the stipulations: That, in exercising them, the property of others was not to be injured. That, before exercising them, special authority should be had from competent local administration, or judicial officers. And that all interested parties be heard by such officer before the authorization should be issued. And the declaration of these rights

was also accompanied by that of an obligation, on the part of parties desiring to exercise them, to conform to administrative regulations applying to the water-courses, or other channels, or works of the locality. (See articles 552, 553.)

The foregoing points were embodied in the Sardinian code which ruled in Piedmont, in the articles here presented for reference:

"Article 551. Lower lands are subject towards those which are higher to receive all the waters which flow naturally, and without the aid of artificial works, from such higher lands.

"The proprietor of the lower estate shall not raise any embankment whereby this escape may be interfered with.

"The proprietor of the upper estate shall refrain from doing anything whereby the servitude of the lower land may be aggravated.

"Article 552. When the channels or embankments which serve to contain waters within an estate are broken down or destroyed, or when variations in the course of the water render defensive works necessary, and the proprietor of the estate fails to restore the channels and embankments, or to construct the required works, then those who shall suffer injury, or shall be in imminent danger of it, can cause the works to be executed at their own expense; they can avail themselves of this power, however, only on the condition that the proprietor of the land on which the works are to be constructed shall suffer no damage; they must, furthermore, receive beforehand the permission of the competent authority, to be given after the parties interested are all heard; and also must conform in all cases to any special regulations which affect the management of the waters.

"Article 553. The same rule shall apply when it is considered desirable to destroy or remove any obstacle to the free escape of waters, in the form of deposits or collections of other materials, within an estate, or in a private water-course, the existence of which threatens injury to adjoining lands.

"Article 554. All the proprietors who have an interest in maintaining the channel and embankments, or removing the obstacles referred to in the preceding articles, may be called upon to bear their shares of the expense incurred, which shall be rated on each in proportion to the benefit he receives from the works. In every case the proprietors shall have the power of proceeding individually against the party or parties who may have caused the destruction or choking up of the channels referred to, for the amount of the expenses incurred, and for compensation for damages caused."

In addition to the preceding clauses expressly pertaining to the subjects of the natural right of drainage, and the obligations or rights of proprietors, relevant to the maintenance of drainage works and channel-ways, the Sardinian code made provision for

the acquirement on the part of individual land proprietors, of the right, as a servitude, of conducting drainage waters across the properties of others, and for the acquirement, by condemnation, on the part of works declared to be of public utility, of titles to the necessary strips of lands for purposes of construction of drainage works of all classes. These provisions and others relating to rights of way for drainage will be treated of in the chapter about rights of way for waters generally. Another branch of this class of legislation is the regulations relating particularly to sanitary matters, and which will be noticed in the next section of this chapter.

Lombardy.—This subject of drainage was of great importance in Lombardy as well as in Piedmont, and commanded special attention, of which some evidence will be found in the third division of the general law of that country, concerning irrigation associations, transcribed in the chapter which follows this; but it is unnecessary to go into the details of the Lombardian legislation or even review it generally, because of the similarity of its principles to those already noted.

The Kingdom of Italy.—The new code for all Italy, superseding the laws for Piedmont and for Lombardy, makes equally full provision for the interest of drainage. (See appendix II.) Articles 536 to 539, inclusive, contain matter to almost exactly the same effect as the articles 551 to 554 of the Sardinian code, already analyzed. The subject of right of way for drainage waters, as will be seen hereinafter, in the chapter on rights of way, is also quite as fully considered.

SECTION III.

Sanitary Legislation.

The Unheeded Teachings of Experience.

No branch of legislation affecting irrigation interests, under the several governments of northern Italy, has been more often the field of enactment than that having for its object the preservation or promotion of good sanitary conditions in irrigation regions; nor has any other line of irrigation legislation been subject to such frequent fluctuations and amendments, or to such radical changes.

The necessity for this class of legislation has been the result of the gradual development of irrigation without proper system in the arrangement of works and without due care in the management of the waters and cultivations; it has been the natural outcome of a practice wherein every individual has striven for his own special advantage, and no consistently and constantly-acting overseeing power has cared for the interests of all, by guiding or controlling a little the actions of each.

To the reader of the annals and the observer of the development of irrigation, reclamation, and drainage practices, it cannot but seem that no people ever would or ever will profit by the former experiences of others in the lines of their intended endeavors. In our day and country one daily sees or hears of projects, theories, or practices, being put forward, the like of which have elsewhere long ago been tried and proven unprofitable, inadequate, or harmful. Personal experience or observation seems to be the only teacher in these lines of knowledge, which those who embark in hydraulic agricultural enterprise admit to their counsel. Professional knowledge of or technical data concerning what has been done elsewhere, with its results and lessons, it would appear have no existence. Superficial observation and blind experiment, guided by the illimitable self assertion of the times, which a plethoric purse prompts or narrower views of self interest stimulate, guide some of our most important enterprises; others are reined by those who look to immediate self aggrandisement, without reference to the legitimate outcome at all; still others, by those who do not know but that the field of their experience is almost a virgin one, and that irrigation, for instance, is a Californian invention.

Seeing that these great interests are here developing under such influences, what must have been the surroundings of the growth of irrigation in Italy several centuries ago, we may well imagine. That the circumstances were unfavorable to the realization of the best results, we may well understand; that the results in many respects were very bad, there is ample evidence at hand.

Sanitary Effect of Unregulated Irrigation.[1]

Not only is all irrigation, where conducted without adequate natural or artificial drainage of the soil, and as ordinarily prac-

[1] Marsh: Rept. Dept. Agri. 1874, p. 366; Smith, Vol. II, pp. 219–224, 319–328, and elsewhere in Vols. I and II; De Buffon, Vol. II, pp. 151–161, and 339, *et seq.*

ticed to effect anything like a full development of the capabilities of lands, in the course of a few years, harmful and injurious to the healthfulness of the irrigators and residents of the region irrigated, but certain cultivations in themselves are unhealthful, and necessitate the use of waters in a manner which specially produces an unsanitary condition of their neighborhood. Trouble of this character made itself apparent in Italy during the fifteenth century, and following upon the introduction of rice cultivation which had been brought into the Venetian provinces in the early part of the century, from Spain. Now, the experience in Spain should have constituted a lesson for the Italians, but it did not. Rice had been brought into Spain by the Moors full two centuries before, and its cultivation had been the cause of most serious fever epidemics and such widespread alarm that regulative measures had been enacted from time to time, and at other times the cultivation had been prohibited altogether by royal decree, and then again allowed under stringent rulings as to locality and the provision of proper drainage.

In general terms, this same experience has been repeated in Italy. The cultivation of rice was first introduced upon marshy tracts unsuited for other cultivation, without expensive reclamation and drainage, and at localities somewhat remote from thickly settled districts. It then spread, by degrees, into the lands irrigated from the great canals, and in the best neighborhoods of the country, approaching the gates of the large cities and the villas of the upper classes of society. Fever epidemics became more and still more prevalent, and many cases of low fever were always present, even when not epidemic, so from time to time there arose most violent opposition to rice cultivation at all, and there was a constant demand for its regulation.

Legislative Regulation of Rice Culture.

Lombardy.—In Lombardy the earliest irrigation sanitary regulation of which there is record was promulgated in 1575. It took the form of restricting rice cultivation to certain areas, and prohibited it within certain distances of inhabited places. From that time on to the beginning of this century the records bristle with regulations promulgated, modified, annulled, and reënacted. In the territory of Milan, for instance, in 1583 the cultivation of rice was absolutely prohibited. In 1593 this was modified by a regu-

lation forbidding rice cultivation within six miles of the city of Milan and within five miles around every other town; and at later dates these distances were successively increased and diminished as the rice cultivators found favor by fair means or foul with the rulers, and as the healthfulness of the country permitted popular sentiment to cool off on the subject, or the unhealthfulness roused the people to vigilance again. In 1630 a frightful pestilence swept over the province of Milan. Rice cultivation was again prohibited for a short time, but again became prevalent. At a later date the distances from the cities, within which rice might be cultivated, were reduced from "long" miles to the same number of "short" miles, and these were to be measured from the centers of the towns and not from the ramparts. And so matters ran on until the beginning of the present century, when Napoleon, formulating the experience of the past and calling to his council the best informed people of the country, promulgated the regulation which remained as the law of the land up to the time of consolidation of the present government of all Italy, and then become the foundation in part for the newer and present rulings.

Piedmont.—In Piedmont the sanitary regulation of irrigation was first seriously attempted in 1608, when the cultivation of rice, in any part of the kingdom, was prohibited, except it be by special royal permit; and it was stipulated that lands to be used for rice cultivation should be confined to those unfit for producing any other crop, and should be situated at least about four and one half English miles from any town or village, and six hundred and fifty yards from any road; that the consent of the heads of two thirds of the families in the commune should be obtained in each instance; and, there should be an obligation on the part of the holder of the permit to secure and maintain perfect drainage for his fields, under the supervision of the government engineers. There were heavy fines named for violators of this law, and other provisions made for its enforcement.

This species of culture had already grown to considerable magnitude in certain parts of the country, and there was much capital interested in the lands and canals devoted to it, consequently there was a perfect storm of opposition to the law. The chronicler, hereafter to be named, says that "complaints *rained down*" upon the government authorities, so that in 1663 the order was modified so as to prohibit the cultivation of rice within four and

one half miles of Turin, three miles around Vercelli, nine hundred yards from other towns, and seventy-five yards from the roads. Then, in 1667, the cultivation was absolutely forbidden in certain parts of the country. And thus the history goes with alternate prohibitions, limitations, regulations, and licenses from that time down to the year 1855, when a commission or committee of the senate of Sardinia was appointed to inquire into and report on the whole matter. This committee reported a history of the legislation of the subject, from which the foregoing brief recital has been drawn, and it then expressed its opinion and made its recommendations, in language substantially as follows:

"Three conclusions appear to us to be deducible from the rapid review just given of the laws affecting rice cultivation, which have grown up among us during the course of two centuries and a half.

"First, that the sole remedy against the insalubrity of rice irrigation, which has been applied in practice, has been to keep it at a distance from inhabited places; but that the limit of this distance has been increased or diminished in a manner wholly arbitrary, and without reference to any theoretical principles or experimental results which warrant the terms selected. We say this was the sole remedy, because, although the laws ordain that free passage shall always be insured for the water, no specific plans for drainage were either suggested or enforced; and the districts where rice cultivation prevails, remain still unprovided with this important means of securing their salubrity.

"The second inference which appears to the committee, no less than the first, is, that a remedy which has been altered incessantly, and at brief intervals, cannot be regarded as a successful one, since it must have failed to produce the results anticipated from it by those who tried it in the various forms.

"Thirdly, it is clear that throughout the entire progress of our legislation it has always been found necessary in endeavoring to limit the extension of rice irrigation to respect the interests which have grown up in spite of the laws, and to sanction the continuance of the culture in places where it had been established for considerable periods.

* * * * * * * * * * *

"The discontents and difficulties created have been such as invariably to force the government to modify its orders and to admit so many exceptions, as, in point of fact, rendered the laws nearly inoperative.

"If, therefore, the ancient laws do not supply examples of successful remedies which we can imitate; if, further, the facts on which a definite law could be founded so as to secure the confidence and respect of all parties concerned do not at this present moment exist, the committee is of opinion that measures should

be taken to collect such facts, and that all attempts at final legislation should be deferred until this preliminary inquiry has been satisfactorily completed.

"On the other hand, the committee is distinctly of the opinion that certain conditions should be attached to permissions to form new rice lands; and, pending the collection of facts on which a final law may be based, they think that a temporary measure may properly be sanctioned. They therefore recommend that the project now submitted be passed by the senate, with the modifications which have been suggested by the committee."—[Smith, Vol. II, p. 326.

The measures recommended by the commission were enacted into law, and remained as the rule of the country, until it was merged into the present kingdom of Italy. The chief points in this law will be given under the next subheading of this chapter.

Sanitary Regulations—Modern Legislation.[1]

As I have before remarked, the necessity for regulation of irrigation, because of sanitary reasons, did not apply only to rice cultivation, although these great contentions and oppositions have come up over attempts to prohibit or put a limit on the extension or continuance of the irrigation of this crop. The modern regulations providing for the preservation of sanitary conditions in Lombardy, specially applied to all meadow cultivations by irrigation, as well as to the fields devoted to rice raising. I here present an abstract of their principal points, and then pass on to the laws proposed by the committee above quoted, and voted by the senate of Sardinia for Piedmont.

Lombardy.—The following is an abstract of the principal points of the irrigation sanitary regulation for Lombardy—promulgated under a law of 1809.

The establishment of new rice fields without special permission of the prefect of the department, was prohibited under pain of a heavy fine upon both the owner of the land and the tenant. Permits were granted for such establishments only on lands situated at least five miles from the capital of the kingdom, three miles from towns of the first class and fortified places, and one and a quarter miles from towns of the second class, and five hundred and fifty yards from the smallest towns; and these distances were to be measured at right angles from the exterior limits of the

[1] See, Smith, Vol. II, pp. 225–231, and 328–331; also, De Buffon.

towns. Cultivations of rice already existing within the limits specified from the capital were to cease within three years after the promulgation of the decree, and the lands be cultivated in other crops, under pain of a heavy penalty. Those existing within the limits prescribed from other places, were to be subject to further regulation after due inquiry in the communes where situated. All rice cultivations were to be conducted in accordance, as to drainage, with regulations prescribed for each case.

The establishment of meadows, whether constantly or periodically irrigated, was prohibited within the limits of thickly inhabited places, and all such meadows were ordered abolished and the cultivation changed before the expiration of the then present year. Permits for the establishment of meadows were to be granted only for lands situated at least eleven hundred yards from the walls of the capital city, and five hundred and fifty yards from those of other places; and in accordance with plans which were intended to insure proper drainage of the fields and disposal of the drainage waters.

Other regulations dated in 1817, prescribed the forms necessary to be observed in applying for and obtaining these permits—amongst which were the submission of plans of the fields to be laid out, examination of them and of the grounds by the government engineers and local authorities, publications of intention, hearings of opposition, reports of engineers and local officers, etc.

Piedmont.—The law reported by the committee, and passed by the Sardinian senate in 1855, and of which mention has been heretofore made, contained points as follows:

A registration of rice cultivations was to be enforced, and heavy penalties were prescribed for the establishment or continuance of rice irrigation on fields not registered. Rice fields established before the year 1848 were permitted to remain; those established after that date, except as by the law provided, were subject to abolition, and their owners to fine and imprisonment. All rice-cultivated lands were to be drained in accordance with plans to be submitted to and approved by government authorities and engineers. No new rice cultivation was to be allowed within certain prescribed limits of towns and cities of different classes, and all rice-cultivated lands were to be surveyed for registration, and their healthfulness assured so far as possible by proper drainage and use of waters. These were the chief provisions of this Pied-

montese law, but there were many others which related to forms and details of administration.

The Kingdom of Italy.—By a law of the 12th June, 1866,[1] the present government of all Italy determined that the cultivation of rice should be permitted beyond certain prescribed distances from collections of houses and under conditions as might be determined in each province. This law provides that special regulations to the above points being agreed upon by the municipal and sanitary boards of the province, and revised by the superior sanitary council and the council of state, might be considered and adopted by the provincial council and afterwards receive the sanction of the King; and the law directed that such action should be taken in each province within six months after its passage.

Any person desiring to cultivate rice is required to give notice to the prefect of the province, according to fixed forms, and at certain times of year, and this application is immediately transmitted to the proper council. This municipal council will, within ten days, declare as to whether or not the terms of the established regulations are to be complied with in the proposed new work, and, if not, it will point out what must be done. The application and report of the council are then published and forwarded through the various departments or branches of government, being subject to opposition and change until finally approved by the King. Promptness of action is insured by a provision that should the matter not be finally reported upon within one month after the report of the municipal council, the cultivation of the rice cannot be stopped for that year. The provincial authorities are given power to stop all rice cultivations not conforming to the terms of the law and regulations; and persons violating these may be subjected to a fine as high as 200 *lire* for each *ettari* (about $16 per acre) wrongfully cultivated.

Thus, the government of Italy has provided a law in general terms, on this subject, and has left the initiation of details, as to specific regulations, to the several provinces, or states as we may say, but still retains for itself the power of modification or sanction of whatever may be proposed. The regulations thus locally proposed vary in a considerable degree, as is natural, and perhaps necessary, under the diversified conditions of the country,

[1] Laws and Regulations, received from the ministry of public works, Italy.

they should, but the tendency of the central supervision is to produce uniformity, and do away with unfair local influences and prejudices. Enough has already been said to show the character of regulations adopted in the principal irrigation provinces, so the subject will not be pursued further in its connection with irrigation legislation.

AUTHORITIES FOR CHAPTER XII.

Smith.—[Work cited as an authority for Chapter IX.] See, Vol. II, P. IV; Ch. I, Secs. 2, 4, and 6; Ch. II, Secs. 4 and 6, and elsewhere.

De Buffon.—[Work cited as an authority for Chapter IX.] See, Vol. II, B. VII, Ch. XXXVIII, Divs. I and IV, and Ch. XL; B. VIII, Ch. XLV, Div. III; and Ch. XLVI.

Marsh.—"Irrigation: its evils, the remedies, and the compensations." By Geo. P. Marsh (U. S. Minister to the Court of Italy, author of "The Earth, as modified by human action," etc.) See, Rept. Dept. of Agriculture, 1874.

Sardinian Code.—[Work cited as authority for Chapter X.] See, articles 599, 600, 601, 633, 551, 552, 553, 554.

Italian Code.—[Work cited as authority for Chapter X.] See, articles 575, 576, 577, 608, 536, 537, 538, 539, and remarks appended to each.

Laws and Decrees.—[Collection referred to as an authority for Chapter VIII.] See, General Law of Public Works; also, Law concerning Rice Culture.

CHAPTER XIII.—ITALY[5];

THE RIGHT OF WAY TO CONDUCT WATERS.

SECTION I.—*The Ancient and Modern Laws.*
Ancient Laws, Milan, 1216; Venetia, 1455.
Piedmont—Code of Charles Emanuel, 1770.
Modern Laws—Lombardy, Laws of 1804 and 1806.
Piedmont—Sardinian Civil Code, 1837.
The Kingdom of Italy—Civil Code, 1865.

SECTION II.—*The Servitude of Right-of-Way for Waters.*
Nature of the Right as a Servitude.
Forms of the Question presented.
The Right of Aqueduct across Lands.
The Right of Aqueduct across other Canals.
The Right of Aqueduct by a Common Channel.
The Right of Aqueduct for Drainage Waters.

SECTION III.—*Condemnation of Way for Works of Public Utility.*
Piedmont—Sardinian Civil Code.
The Kingdom of Italy—Civil Code.
Expropriation Laws.

SECTION I.

THE ANCIENT AND MODERN LAWS.

Right of Aqueduct—Some Ancient Laws.[1]

The necessity for a legal method whereby readily to obtain the right to conduct water from a source or head of supply, across lands the property of others, and to construct and maintain works therefor on such lands, presented itself at a period very early in irrigation experience in Italy; indeed, it is probable that the realization of this point was transmitted to the Italians in some law of custom from the experience of the Romans.

"From all time the conducting of water for irrigation has been recognized as having been of special public use, which, without

[1] See, Smith; also, De Buffon.

giving so extensive a right as appropriation, justified a notable curtailment of the rights of property."—[De Buffon, Vol. II, p. 267.

The *servitus aquæ ductus* of the Romans has reappeared in Italy as the *diritto d'acquedotto*, and, so far as known, commencing with the active extension of some great canal works, in the Milanaise province in the twelfth century, as a friendly sufferance on the part of landholders anxious to see the enterprise go on, it has developed into a well defined and thoroughly established feature in the division of servitudes established by process of law. Although thus allowed at a very early period, the right to cross the estate of another with a canal or ditch was for a long time the subject of grave dispute in northern Italy. The several provinces were not of the same mind on the subject, nor yet were the various parts of the different provinces, united.

Milan.—Commencing, as a custom, so far as known, in the Milanaise province of the country now known as Lombardy, we find there the earliest recorded recognition of it in the form of law. This is in a code dated in 1216, which contained articles on the point, substantially as follows:

"1. Whoever has the right to obtain waters from springs or rivers, or in any other manner whatsoever, may carry it through the fields and farms of any individual, commune, or public corporation in this state, and also across the public roads.

"2. To this end he may construct canals or channels and the other necessary works, at the least possible inconvenience and injury to the proprietors of the farms, paying one fourth more than the true value of the land thereby occupied.

"3. In addition he must repay all damages caused by the works, according to the estimate of two practical men; provided, however, that the compensation for damages shall in no case exceed twice the value of the property damaged.

"4. He shall be bound to maintain in sufficient repair, at his own expense, the bridges and drains required for the passage of water, whether on the farms or across the roads, so that these latter shall suffer no injury, especially in rainy weather.

"5. The water may be conducted or caused to pass above or below the canals previously existing, new channels of brick and lime being made for it in such manner as that the water flowing under shall not be mixed with that flowing over, or that flowing in the preëxisting canals.

"6. The new channels must be maintained in such condition as that the proprietor of the water at the upper levels shall suffer no damage from the reflux of the same. The water shall have a free and unobstructed course."

Old as is this law, it will be seen, as this matter in hand is traced forward, that it contained all of the essential principles of a complete code on the subject, and has only been amplified, but not very greatly added to since.

Venetia.—In 1455 the venerable senate of the republic of Venice passed a law on this point for application in its province of Verona, whose provisions were as follows:

"Whoever shall obtain the right of establishing an irrigating channel, may demand a passage for the water across the land of any other person, paying, however, to the proprietor, twice the value of the land occupied. This value shall be fixed by experts chosen by the parties interested; and it shall be payable in advance, unless the proprietor of the land is willing to grant delay of payment.

"On due appraisement and offer of payment the transfer of the land is made obligatory, and should be effected by proper documents; but should the proprietor refuse, the administrative authority may adopt compulsory measures, because the right to the possession of the land for this purpose exists without reference to the inclinations of individuals, corporations, or communities; and possession obtained in the execution of the present statute shall be held good and sufficient as against the grantee.

"In the case of a proprietor refusing all acquiescence in the possession thus granted, and declining to receive the price of the land fixed as above prescribed, this price shall then be deposited with the authorities, and immediately thereafter the works of irrigation may be begun. When parties differ as to the proper position of the channel, the experts must always select the place least injurious to the property traversed; and the same rule must be observed in case of disputes about the location of channels sanctioned prior to the publication of this statute."

Piedmont.—Some ancient Piedmontese legislation on this subject is found in a clear form in the code of Charles Emanuel, published in 1770, as follows:

"Every commune, corporation, or individual whatever, shall be bound to grant a passage through their lands for waters legitimately derived from rivers or fountains, whether for irrigation or machinery. This passage shall likewise be granted through existing canals and water-courses, provided always that this operation shall cause no injury to the proprietors of these canals, and shall in no way impede the free course of their own proper waters. Whoever claims a passage for his water-course across the property of another ought to effect the same with the least possible injury. The proprietor of the water shall pay the value of the soil occu-

pied, with one eighth in excess, as estimated by professional men. He shall further repair all damages he may cause, or pay the full value of the same.

"When a channel intersects another canal or water-course of any kind, the passage shall be effected either above or below, by means of appropriate works. The proprietor demanding passage shall be obliged to deposit security for all damages which may be caused by the said works to water-courses or canals previously in existence. This precaution being observed, the proprietor of the land cannot impede the execution of the works, but ought to lend all practical assistance during the period of their construction. The definite settlement of the amount of compensation for damages shall be made on completion of the works. In the event of the construction of the water-course causing a marked diminution of the extent or value of a property, the party claiming the passage shall be bound not only to pay compensation for all injuries as estimated by professional men, but also to purchase the entire property, should its owner so desire."

Right of Aqueduct—Some Modern Laws.

Lombardy.—Following the very ancient Milanese code, which has been transcribed under the preceding subheading as a matter of interest because of its remarkable completeness, considering the time of its production, in all times, down to the beginning of this century, the right of way to conduct water was a prominent subject for legislative and administrative consideration by the various governments and rulers who held dominion in the states of northern Italy. Particularly was this so in Lombardy; and especially complete does the history appear to be of the various phases which the question assumed, and the steps taken in connection with it. Of all the lines of administration, however, that which was under the guidance of Napoleon treated this subject most fully, and in the most advanced spirit. The law for the administration of the waters of the Lombardo-Venetian kingdom, promulgated by him in 1804, was the most complete and satisfactory to all parties interested that the country had ever had. And this, together with administrative decrees made under it, and dated in 1806, made up the system governing rights of way for water.

In after years (1816), when under other rule, the Austrian civil code was promulgated for this same kingdom, the good principles of the Napoleonic law, and its predecessors on this point, were overlooked, and great trouble resulted. It was considered that

Lombardy had lost a most essential feature of her administrative legislation; and appeal after appeal went hence to the ruling power to reëstablish the ancient principles and regulations. Cases wherein their absence wrought serious hardship to individuals, and detriment to the agricultural welfare of the country, were carried before the Aulic council, at Vienna; and finally, by the advice of that superior administrative body of the Austrian government, the question was set at rest; and the former law of 1804, and the several decrees on the same general subject which had closely followed it, were reëstablished by an imperial decree in 1820.

De Buffon says: "The deliberations of the Aulic council were remarkable for their equity as well as for the enlightened views expressed, including amongst other reasonings, the following considerations:

"'Running waters in that country (Italy) are necessary to the nourishment of the land; they increase its fertility and assure the products. * * * Where water is so useful and contributes so powerfully to the growing of the products of the soil, doubts of its influence on the public prosperity should not be raised. * * * The new civil code should and does not oppose anything on this subject contained in the former laws and regulations. * * * Hence, under the terms of this Austrian code, they should, and do, remain in force.'"—[De Buffon, Vol. II, p. 305, quoting the decision.

The following are the provisions on this point of the law of 1804, thus re-declared to be the rule for Lombardy:

"Article 51. Every individual is bound to cede the land necessary for the channels, the rectifications of the directions, the alteration of the courses, or the embankments of rivers, canals, or public drainage channels; and, in general terms for all works connected with water, which are designed for the public good, receiving compensation for the same at a reasonable rate.

"Article 52. Whoever desires to make use of waters, public or private, of which he is the legitimate possessor, for purposes of agriculture, or for the movement of machinery and hydraulic works, may carry them across the lands of others, paying the value of the soil occupied by the canal, according to an estimate of the same, with one fourth in excess; and coming also under an obligation to maintain the said water-course, banks, works, etc.; and, further, to indemnify the proprietor of the land for all damages whatsoever which the said land may sustain.

"Article 53. Such water-courses should be carried across the portion of the estate where, according to the judgment of practical men, the least possible injury shall be caused to the proprietor, or

possessor, reference being always had, however, to the convenient derivation of the water."

In addition to the foregoing, the law of 1806, also reëstablished in 1820, contained the following provision on this subject:

"Article 16. Whoever desires to introduce water into a public canal, with the view of taking it out again at a lower point, shall submit his claim to the direction-general. It will be decided so as to cause no injury to the rights of other parties. Objections to such arrangement will be disposed of by the public administration."

These laws formed the basis and principal part of all legislation on this subject in Lombardy down to the time of the promulgation of the Italian code in 1865.

Piedmont.—Following the code of Charles Emanuel III, published in 1770, and herein already transcribed, the legislation on the right of way for waters in Piedmont was contained in the Sardinian code of 1837. The very complete provisions of this code are worthy of a closer examination than those of any law which preceded it, and such examination will be given them in the next section of this chapter, where the subject is arranged for comment.

The Kingdom of Italy.—The present law on this subject for all Italy, is contained principally in articles of the Italian civil code (see appendix II), which will be noticed in the following section of this chapter together with those corresponding in the old code of Sardinia.

SECTION II.

The Servitude of Way to Conduct Waters.

Nature of the Right.[1]

The great questions which came up so early in Italy in the matter of right of way for water, were with respect to such right when exercised as a servitude: cases of the legal occupation of one man's property by another, for the purpose of leading water across it in a canal or other conduit, without purchasing title to the property itself. The exercise of such privilege was opposed

[1] See, De Buffon, Vol. II, Ch. XLII, Ch. XLIII, p. 279, and Ch. XLIV, p. 307; also, Smith, Vol. II, p. 149.

on the ground of its being subversive of the right of property: no person, it was maintained, should have the power by simple and summary process of law, to acquire a right to continuously occupy for his purposes, any portion of the property of another. Such occupation was virtually a dispossession of one's estate in favor of another. The right of taking private property could only be exercised in the interest of the public welfare—for the purpose of public use. Conducting water for the irrigation of private estates was not a public use. The law defined what was a public use, and made provision for the condemnation of private properties, and the acquirement of title to them, when it was necessary to take them for such use. These were the arguments against the "right-of-aqueduct," as it was called.

On the other hand it was urged, that the application of water on lands so far increased their productive capacity as to make such employment a matter of great public concern and interest; that it was a general necessity in the agriculture of the country; that it could not be used without conducting it across intervening properties; that even the waters of public canals could not be distributed away from those canals without so conducting them in small private canals; that in this connection, certainly, the conducting in such small private ditches was a part of the system of the public canal, and hence a part of the necessary machinery for the public use of the waters; and that if conducting waters in a small private ditch as a distributary from a public canal was the exercise of a public use of the water, then the conducting of water from a public stream in a similar ditch was equally an exercise of a public use of it, and hence an act entitled to the privilege of occupying any property for the purpose, on making due compensation.

Form and Amount of Compensation.[1]

These questions were hotly discussed for centuries in Italy. As a general thing, the feudal system of land tenure was opposed to the exercise of the right to conduct water; and upon its downfall the servitude for this purpose of "aqueduct," and with it irrigation enterprise, received a great forward impulse. It has never been proposed to take property for right-of-way for a canal without due compensation; on the contrary, the custom and law, as well, in

[1] See, De Buffon, Vol. II, Chs. XLII and XLIII; also, Smith, Vol. II, pp. 147-150 and 272.

Italy has always been to pay for the simple right of using the strip of land necessary for a canal, at its full value with the addition of a considerable percentage advance. The facts that a canal or ditch across a property not only occupied a certain portion of its area, but oftentimes occasioned its owner inconvenience, and that the presence of the water might be injurious to the land, and other similar considerations, were not lost sight of. And, furthermore, it was conceded by the advocates of the right, that the use of water for private purposes, although a necessary general use, was not a public use in the true sense.

De Buffon says: "It resulted from these considerations, that besides the recognition of the right as belonging to an irrigator, to cross with his ditch the property of his neighbor, there was stipulated in favor of the persons whose land was thus occupied an equitable regulation which aimed to make amends for the difference of taking property for public use proper, and occupying it for a purpose only indirectly for the public benefit. This rule consisted in the payment of a certain sum greater than the value of the land occupied, and the repairing of all damages occasioned by or accessory to its occupation.

"The amount of the additional indemnity, which is characteristic of the *right of aqueduct* as established by all modern nations, is variable in its nature, and has been repeatedly modified since its origin in the fifteenth century, and varied between its actual value, and twenty to twenty-five per cent advance. In Lombardy one pays one quarter more than the land occupied is worth; in Piedmont one fifth more, as an indemnity for damage, on values estimated in a friendly way on the opinions of experts."—[De Buffon, Vol. II, p. 279.

Baird Smith says that, in the earliest form in northern Italy, the right of passage for waters across lands "was granted on condition that some certain supply of water should be allowed to the proprietor of the land from the canal traversing his property, in exchange for the occupancy of the soil covered by it, the use of which was temporarily lost to him." And he remarks that it is a curious circumstance that the same practice had been inaugurated at the earliest stage of the modern development of irrigation under English rule in India.[1] In cases where water was not allowed in exchange for the land occupied, the practice, in Italy, at first was to pay only the value of the land covered by the works, and thus

[1] The same custom formed a feature of irrigation development in early times in California; and there now exist perpetual water-rights, in some quarters, granted in return for a crossing of a field by a canal.

rendered useless, but, as time wore on and canals became more plentiful, this bonus has ranged in some quarters as high as fifty per cent on the valuation of the lands.

Forms of the Right-of-Way Question.

The primitive question was as to the right of conducting water across agricultural lands in a ditch; and supplementary to this came that of the right to cross with one such conduit the path of another, which acts in the early days of hydraulic works in Italy, before the art of making "syphons" and other structures to facilitate the crossing was understood, and later when such works were very expensive, oftentimes necessitated the mingling of the waters in one channel and their subsequent separation. And, then, as an outcome of this practice came up a question as to the right of one person, by paying an indemnity, to conduct waters for his benefit in the canal or ditch of another. In addition to these three forms of the right-of-way problem, as connected with the matter of conducting water for use in irrigation, the same questions came up in connection with the right to conduct drainage waters from irrigation, drainage waters from works where such waters had been produced by other than natural causes, and drainage waters produced or accumulated naturally.

These varied natures, as to origin and purpose, of the waters to be conducted, produced modifications in the treatment which the questions have received, and in the rulings which have been made and incorporated into law on them. These subdivisions of the subject were for the first time all fully treated in the general laws of a country, by the framers of the Sardinian code, which was, in matters relating to irrigation, founded on experience in and the necessities of Piedmont. The present code for all Italy largely followed after this model, so that I am led to present the subject upon the basis of the former law, and then, for each subdivision, point out the comparisons to be made with the latter which has taken its place.

The Right of Aqueduct Across Lands.

(*Sardinian Code, Articles 622, 626, 627, 629, 640, 663, and 673; Italian Code, Articles 598, 602, 603, 605, 619, 648, and 666.*)

The provisions of the Piedmontese law, which specially related to the simple right of way for waters across lands, were contained in seven articles, as follows:

Articles of the Sardinian Code.

"Article 622. Every commune, corporation, or individual, is bound to give a passage across their lands to water derived from rivers, springs, or any other sources, by parties having a legal right to the same, and wishing to employ it for irrigation, or for the use of works. Farm houses, with the courts, threshing floors, and gardens attached to them, are excepted from this ruling.

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"Article 626. Whoever desires to carry water across the lands of another is bound to prove that the quantity of water whereof he is the proprietor is sufficient for the purpose to which it is destined; that with reference to the circumstances of the neighboring lands, the slopes and other conditions of the channel, the course and the free escape of the water, the line of passage demanded by him is the most convenient, and at the same time is that which will cause the least possible injury to the estates affected by it.

"Article 627. The party desirous of carrying water over the land of another is bound to pay in advance, and before the construction of the canal is commenced, the estimated value of the ground to be occupied, without deduction of the land tax, or any other burdens which may be inherent to the soil, together with one fifth of the said value in excess, and also compensation for immediate damages, including those due to the division of the estate into two or more parts, or any other deterioration which may follow on the crossing of the land.

"In cases wherein the right of passage is claimed for any period less than nine years, the amount to be demanded by the owner shall be limited to one half the value of the land occupied by the works, with the fifth in excess, and compensation for damages as above detailed. The claimant shall further come under obligation to restore everything to its original state on the expiration of the term agreed upon. If the party who has obtained a temporary right of passage should desire to change it into a permanent one, the payment of the half value of the land, and the other terms annexed to the former, shall not be taken into account in settling the conditions of the latter.

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"Article 629. In the event of the party who has obtained the right of passage for a certain quantity of water, desiring to increase the same, he shall be bound to show, first, that his canal has sufficient capacity to carry the greater volume, and that no injury can result to the estate subject to the servitude. When the introduction of the larger volume of water requires the construction of new works, the nature and extent of these must be determined, and the value of the soil to be occupied, according to article 627, must be paid prior to the commencement of the said works.

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"Article 640. The servitude of taking water by means of a canal, or other visible and permanent work, for use in agriculture and industry, or for any other object, is included among the number of continuous and apparent servitudes.

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"Article 663. The right of passage for water does not give to the party exercising it any right of property, either in the land at the sides or forming the bed of the spring or water-course; and the land tax, with all other burdens attached to the soil, shall be borne by the proprietor of the aforesaid land.

* * * * * * * * * *

"Article 673. The servitude is extinct if not used for thirty years."

The Right of Aqueduct Across Lands—Noteworthy Points.

Piedmont.—The foregoing provisions of the Sardinian code are replete with points worthy of special notice:

Observe that the right of passage is accorded even to every individual across the lands of every other individual, municipality, or corporation; and that it is accorded for waters derived from any source whatever; but, under this law, only for the purposes of irrigation and motive power works. Take notice, at the same time, however, that the right is extended only to those who have a legal right to the waters, and that, hence, in opposition to any such claim of right of way a land owner can force the would-be conducter of the water to prove his claim of right to the water itself, before he may exercise his privilege of acquiring a passage way for it. (See article 622.)

Thus, the water-right claim itself was immediately put upon its merits. There could be no canal until there was a determined right to a definite amount of water to conduct in it; and such rights, as we have seen, could only be acquired by regular issue of privilege, or concession by the government, or by parties controlling the use of, or owning, the water; or they could result from ownership of a spring, or other water-source, such as a reservoir, or from riparian proprietorship on a stream not considered of public importance. Here, then, in these provisions on this collateral branch of the water-right question, was a safeguard against the establishment of works, and of diversions afterwards to be embroiled in litigation: the right to the water had to be proven before a right for its passage could be acquired. Furthermore, notice the fact that the right could not be acquired for trifling and insuffi-

cient quantities of water: the "proprietor of the" (right to use the) "water" had to prove that he had a sufficiency of supply for his purpose, before he could impose upon his neighbor's estate a servitude of passage and the presence of a canal built by virtue of it.

"Very minute care was taken in the legislation of Piedmont to secure at once the efficiency of works, and the minimum of injury to lands on which they were established. Experience had shown in this country that parties frequently excavated a small well or spring on lands belonging to them; and, though the quantity of water derived from it was very trifling, they claimed the right of passage for it through irrigated fields, or in the vicinity of previously existing canals, with the view of drawing from these sources, by drainage or percolation, an additional supply at the expense of their neighbors."—[Smith, Vol. II, p. 271.

The provisions which stopped this sort of imposition were contained in article 626, where we have found, also, the certain other salutary items next noticed. The location and design of a canal or other conduit for water across the lands of another, had to be in conformity to good judgment, not only with respect to the particular service for which it was designed by its proposed constructer, but with all due regard to the continued convenient use and fruitful quality of the lands designed to be crossed; and the determination of these points was, in common with all technical and practical questions, connected with adjustments of irrigation agreements, left to hydraulic or agricultural engineers, as experts.[1]

"It became further clear that merely to secure the proprietor of the land from immediate pecuniary loss was not sufficient. In fixing the directions of their irrigation channels, proprietors of water might be influenced by various motives; they might desire to pass through land previously irrigated, that they might have the benefit of infiltration, or over land where there were indications of subterranean spring waters, of supplies from which their canals would derive advantage; or they might wish to benefit one neighbor by carrying water near his land, or to injure another by a contrary course. The government saw that it would be necessary to place limits on this freedom of choice, and hence originated the rule that prior to any special direction being determined for the canal, evidence must be laid before the competent authorities that the line selected was the least injurious to all parties concerned."—[Smith, Vol. II, p. 150.

Following out this line of policy, exacting a well determined and defined right in each case where a passage is demanded for

[1] See, Smith, Vol. II, p. 271.

waters, article 629 of the code, as we may have noticed, recognizes the fact that any such right was accorded only for a certain quantity of water and no more, and that when this amount was to be increased, further proceedings had to be conducted, and additional indemnity had to be paid. This provision was made necessary by the fact that any material increase in the waters of a canal necessitate its artificial enlargement, endanger its banks and the adjoining lands by overflow, force its enlargement by scouring out its beds and caving down its banks, or cause great additional loss by percolation into the soil of its bed and banks.

The experience of the country had made these things apparent; and it had also made apparent the fact that right of passage for any limited supply of water having been acquired and paid for, not infrequently its possessors would impose upon the land owners by forcing the flow of the canal, either for temporary convenience to supply some immediate necessity, or with the view of causing a permanent enlargement of the channel, and thereby acquire water-way for a volume of flow materially more than they had demanded and acquired the right for at first.

As will be seen elsewhere in this report, by a provision of this same code, the property owner, in consequence of this same line of imposition practiced by conductors of water, had always the right to demand that the grade plane and cross sectional dimensions of a canal through his lands should be fixed at convenient and necessary intervals along the line, by permanent and solid constructions of masonry, or other unwearing material, so that, at any time, should the canal bed be washed out at intermediate points, it could be reëstablished at exactly its former dimensions and grade by means of the guide furnished by the masonry or other solid structures along its line. These structures also served the purpose of guides by which to reëstablish the section and bottom plane of the canal when each year, in case of silt deposits having occurred, it became necessary to clear it out for the season's work.

As to conditions attached to the simple right of way for water across lands, it remains only to notice the exception to the enforcement of the servitude, which was in the case of passage across gardens, dooryards, or the sites of houses. There was a vigorous fight against this reservation in Piedmont, and, in fact, in some former laws there was no such reservation, but the framers of the Sardinian code took the view that only in cases of works declared to be of public utility—under the right of condemnation and ac-

quirement of title to the land—should a man be disturbed in his house or its immediate surroundings.

Compensation for Right of Way.

Piedmont.—Under the terms of the Sardinian code the proprietor who obtained a right of way for waters thereby acquired a right to the use of the strip of land necessary for the purpose, but he could devote it to no other use. He obtained no right of ownership in the land itself. The owner of the property retained this, and even had to pay the land tax on it for all time, although he had no use of it. (See, Art. 663.)

The right of the possessor of the servitude of passage was "a continuous and apparent servitude;" which meant that, unless expressly limited in an agreement, it continued during every moment of all time, even though not exercised continuously—saving the condition imposed on all such servitudes, whereby they were forfeited by non-use for thirty years. (See, Arts. 640 and 673.)

But, although the right acquired was only one of use, and not of ownership of the land occupied by the canal or ditch, the possessor of it had to pay in advance the estimated value of the land occupied, without deductions from any cause, together with one fifth of its value in excess, for the right of occupation and use; and besides that he had to pay a sum as compensation for damages to the balance of the estate crossed, by reason of inconvenience in its use, caused by the presence of the canal or ditch, or by reason of any probable injury caused to lands by seepage, or otherwise. (See, Art. 627.)

In consequence of this possible damage, also, as will be seen elsewhere, the owner of a canal had to keep it in a certain state of repair and efficiency, and to do all in his power, on demand, to prevent percolations into adjoining lands. And not only had the would-be conducter of water to pay for his original right to cross an estate with his ditch, or canal, but he was limited to the right to conduct the amount of water stipulated and in the canal defined, and any exercise of right in excess of such prescribed privilege had to be sanctioned by a renewed negotiation and agreement, and obtained by an additional payment. (See, Art. 629.)

Finally, as may have been noticed, there were provisions for temporary as well as permanent rights of way, which were made to meet the convenience of tenants under lease of lands. Such leases were usually of nine years' duration in Piedmont, and oftentimes

a tenant would desire to obtain additional or other waters for a field for the period of his lease, only. To cover these cases the second paragraph of article 627 made provision that the right might be acquired for such period or less, by the payment of one half the value of the land occupied, with the one fifth additional and the resulting damage to the lands crossed, as before explained. It is noticeable that a temporary right-of-way could not be converted into a permanent one by the payment of the other half value of the land. Could this have been done, landlords would have taken advantage of the necessities of their tenants, to acquire permanent rights-of-way for waters for their estates, at half rates. But the law did not allow this; so that tenants were put in a position to deal on better terms with landlords, when additional supplies of water were required for an estate which they were farming.

This completes all necessary remarks on the articles of the Sardinian code relating to right-of-way for waters across lands by independent channels. It is now well that the provisions of the new code for all Italy be examined for comparison on this point, before going on to the next classification of the right-of-way matter.

The Kingdom of Italy.—The rulings of the new Italian code that take the place of those of the old Sardinian, upon which comment has just been made (articles 622, 626, 627, 629, 640, 663, and 673), are contained in its articles 598, 602, 603, 605, 619, 648, and 666, to be found in appendix II, and to which reference may be made in continuation of these points concerning "The right of aqueduct across lands."

The Right of Aqueduct Across Other Canals.

(*Sardinian Code, Articles 624 and 625; Italian Code, Articles 600 and 601.*)

This question came up at an early period in the development of irrigation in Italy, and for a long range of time it was decided on the basis of the question of conducting water in a common channel, which is next spoken of herein. The waters at a point of crossing of two canals or water-courses were taken into a common channel for a short distance, if it was desired to cross almost immediately, and then separated into two channels again by some structure designed to repartition them proportionately. Thus this necessity for the crossing of streams or canals was probably the form which the question of a common channel took in its earliest

stages, and the mingling of waters for the short space at crossings possibly suggested the mingling for purposes of economizing in conducting it for long distances.

Be this as it may, as more fully explained under the next subheading, the practice of uniting waters of separate owners and again partitioning them, gave rise to so much trouble, that the construction of special works to effect crossings of streams, without such mixing, was stimulated; and with success in this practical solution of the question came denial, in the laws, of the right to the mingling of waters; and the bare recognition of the right to cross one canal with another, in the way most suitable to the locality, and under certain restrictions, that, except in rare cases, defeat the practice of mingling altogether, is all that is left of the former right to cross as one chose.

Articles of the Sardinian Code.

"Article 624. It is also permitted to carry water across existing canals and water-courses in such manner as may be most expedient, and best adapted to the locality, and to the condition of the said lands and water-courses. It is necessary that the works to be constructed for the above mentioned purpose shall not stop, check, or accelerate, or in any other way change the course or the volume of the water flowing in the canals or water-courses.

"Article 625. In carrying water across public or district roads, or across rivers or torrents, the special rules of the department of roads and waters[1] shall be observed."

The Right of Aqueduct Across other Works—Noteworthy Points.

Piedmont.—The true meaning of the foregoing article 624 is only appreciated when we thoughtfully read the conditions attached to the apparently free right which it gives the owner of one canal to construct his channel-way across the work of another, and when we know something of the interpretations which have been given it, and the practice under it. The passage, as we observe, must be effected "in such manner as may be most expedient and best adapted to the locality and to the condition of the canals and water-courses," but the works to be constructed in effecting the crossing "shall not stop, check, or accelerate the speed of, or in any way change the course or the volume of the water" crossed.

[1] The civil engineering bureau of the government.

Now, no crossing of one flow of water by another in the same channel could be effected under these conditions: anything like a direct flow across *would* "change the course" of the current sought to be crossed; except under special arrangements involving a change of grade of such water-course, such an attempt *would* "check" its current above and "accelerate its speed" below; and any attempt at thus crossing, at all, would increase its volume and then diminish it again. Furthermore, any use of a common channel is virtually prohibited by articles 623 and 628, which are to follow under the next subheading; and the crossing of waters through other waters involves a mingling of the two, a use of a common channel, and a re-separation, even though the distance of flow together be the shortest possible. The fact is that this article (624) was intended to do away with crossings involving mingling of waters, and the conditions as to the manner of the crossing and its adaption to the condition of the several works, contained in the first clause, were intended to regulate the construction of syphons under or aqueducts over these water-courses in effecting the passage.

The Kingdom of Italy.—In continuation of this subdivision of the topic, attention is now asked to appendix II, where in articles 600 and 601 of the new Italian code will be found the items of the present law which supplanted those contained in 624 and 625 of the old Sardinian code upon which I have just commented, and where I have brought the subject of "The right of aqueduct across other canals" down to date.

The Right of Aqueduct by a Common Channel.

(*Sardinian Code, Articles 623 and 628; Italian Code, Articles 599 and 604.*)

The right to make use of an existing channel or canal, in which to conduct waters—mingling them with waters of other ownership, and then reclaiming and separating out an equal or equivalent quantity, and diverting or drawing it off at some point below—is one which found place amongst the customs of the Italians at a very early period.

Lombardy.—At the time of the construction of the greatest of the ancient canal works in this valley—a truly monster canal, built during the twelfth and thirteenth centuries—there had been several other works of considerable magnitude, together with their

branches, carried through the region to be traversed by the new. The art of hydraulic construction had not yet accomplished the building of large size syphon tubes under, or aqueducts for great volumes of water over existing water-courses, and such works, too, would have been exceedingly expensive for the times. Necessity, at this time, brought about the practice of uniting the waters of the old works crossed with those of the new works constructed, and then separating them again at points below, according to the gauging of outlets, or the proportioning of channels.

This is looked to as the beginning on a large scale of a practice which grew into almost a fixed custom in Lombardy, and for a long time was regarded as embodying one of the principles of the customary law of irrigation. It never found place, as a servitude to be laid on private works, in the written statutes of Lombardy, however, and its practice brought about such disputes over the measurements on the repartitioning of waters thus mingled, that the building of structures to avoid the mingling, by dipping one canal down under the other, or carrying it around and over it at lower points, was greatly stimulated, and the common use of channels, without common and free consent, was prohibited. Thus, article 5 of the Milanese code, transcribed in the first section of this chapter, though not explicitly so, is virtually a prohibition of the mingling of waters in a common channel.

But, in the meantime, there had grown up a very wide range of practice in this mingling and repartitioning method of crossing and conducting waters of different owners, and the annals of Italian irrigation literature are plethoric with accounts of litigations to which it gave rise. The advance in hydraulic art—in the measurement of waters—has, however, made these troubles less frequent, as the practice became more perfect and less open to objection.

The privilege of introducing waters into the government canals and then reclaiming them at a point below, was one specially open to abuse and eagerly sought after. De Buffon, speaking of the privilege granted to individuals by the Austrian rulers of Lombardy, to introduce water into the royal canals, and then reclaim it at a lower point, says "that having all the appearance of an equitable concession, the right has hardly ever failed to degenerate into an abuse." The absence of means and even of the possibility of accurate gauging of the amount taken in, and a just partitioning off of the amount taken out in return, and the opportunity,

through the absence of continuous guarding, to take more than was due, was an incentive to the desire to obtain the privilege.

"Had such means existed at the times of which we write, demands for the introduction of private waters into the grand canals would have been less frequent. Justice and good sense are in accord in rejecting the idea of similarity between the simple conducting of water over the property of a neighbor, and the exercise of a right to make use of his canal already existing."

Damage caused by the construction of a canal across lands may be readily estimated and liquidated, but the injury which may be inflicted by one dishonestly inclined, upon the owner of a canal by introducing his waters therein and then reclaiming them at a point below, is a cumulative one past all finding out, and not to be estimated at all in dollars and cents alone.

"The owner of a canal, upon whom it is sought to impose such a servitude, may well reply: Our waters would be so mixed that independently of the injury you could cause me in retaking from the canal more water than you had turned in, you oblige me to keep a constant surveillance over you while doing so, and you compel me to keep up a perfect understanding with you in regard to the maintaining, clearing, and stoppage, or continuance of flow in the canal, on terms upon which we probably could not agree; in a word, you impose on me a perpetual community of interest which I have not sought, but opposed."—[De Buffon, Vol. II, pp. 282–286.

The modern legislation of Lombardy contained this one provision on the subject in hand, and this was embodied in the decree or law of 1806, to which reference has heretofore been made.

"Article 16. Whoever desires to introduce water into a public canal, with the view of extracting it again at a lower point, shall submit his claim to the direction-general. The case will be decided in accordance with article 4 *(i. e.*, so as to cause no injury to the rights of other parties). Objections to this arrangement shall be disposed of by the public administration."

It will be noticed that this article applied only to the introduction of water into the public canals of the state, and that it set up no basis of a right of servitude in connection with such license, but made it a mere privilege, to be extended or not extended, according to circumstances and the judgment of the superior administrative officer in charge of the works. It formed no basis for the assertion of right to use a preëxisting private canal, and as a matter of fact, the right has never been asserted as a servitude in

modern times in Lombardy, and rarely asked, and less rarely granted, as a privilege, in the case of the government canals.

Piedmont.—In Piedmont this right first found place in the laws of the latter part of the sixteenth century, but not until the last part of the eighteenth did it assume a definite and somewhat complete form in the legislation of the country. The edict of Charles Emanuel, published in 1770, and heretofore quoted, established the right in such broad and sweeping terms that great trouble resulted, and it became necessary to abolish it. The framers of the Sardinian code, long afterwards (1837), followed out this last line of policy in the wording of the following articles:

Articles of the Sardinian Code.

"Article 623. The canal required for the water shall be executed entirely at the expense of the party claiming the right of passage, and he shall have no right whatsoever to demand the said passage through canals previously in existence, and destined for the use of other waters. The proprietor of any farm, however, whereupon a canal carrying water of which he is the legal owner already exists, may prevent the opening of a new canal on the said farm, by offering to give a passage to the waters of another through the preëxisting channel, always provided that this can be done without manifest injury to the party claiming the right of passage.

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"Article 628. Any one availing himself of an offer made under the terms of article 623, to allow his supply of water to flow through the canal of another, is bound to pay, in proportion to the volume of water introduced by him, his share of the value of the land occupied by the works, of the excess and compensation above (in article 627) fixed, and, further, to defray in the same proportion the costs for repairs, maintenance, and every expense which the introduction of said water may have rendered necessary."

The Right of Aqueduct by a Common Channel—Noteworthy Points.

Piedmont.—As a commentary on the last two articles of the Sardinian code, I quote the words of Baird Smith, as follows:

"The vexed question of the right of passage through previously existing channels has been very judiciously disposed of by the Sardinian legislation. To have continued this right to the possessor of water in the absolute manner established by the ancient legislation of Piedmont, would, as experience had already shown, have led to constant and harrassing disputes. The edict of Charles Emanuel, on which the right spoken of was founded, had been followed by repeated lawsuits; and though the judicial tri-

bunals had necessarily decided all cases in accordance with its provisions, the senate of Turin had especially recorded its opinion, that the law was one of great severity. It is also recorded that there was scarcely ever a single case in which the results of the union in the same canal, and the subsequent division of the water belonging to two different proprietors, were satisfactory to both."—[Smith, Vol. II, p. 270.

De Buffon, also, has written of the necessity for, and justice of, this portion of the Sardinian code. Here are his sentiments:

"The power of acquiring a right of way for waters through existing canals, which, as we have seen, was admitted by the ancient legislation of Piedmont, has, for good reasons, been left out in the formation of the new code. * * * The authors of this code found, with reason, that it was unjust to impose upon proprietors the obligations to receive strange waters into their canals, races, or ditches, as experience had proven that such mingling as resulted therefrom seldom failed to lead to litigations, disastrous to all interests."—[De Buffon, Vol. II, p. 329.

Analyzing for ourselves articles 623 and 628, we find the right of passage through the canals of another expressly abrogated—whoever acquired a right of way across lands under article 622, already considered, under article 623 had to construct the works for carrying the water entirely at his own expense; except in the case where the owner of the land to be crossed, possessing a canal which could serve for the accommodation of the waters desired to be conducted, might, in order to save his land from being cut by another channel, offer to accord the right to use his canal. Then article 628 makes provision for his compensation, if his offer is accepted, for the use of his work and the occupation of his land.

The Kingdom of Italy.—Following this subject of "The right of aqueduct by a common channel," I now invite attention to articles 599 and 604 of the new Italian code, found in appendix II, and which took the place for all Italy of the foregoing 623 and 628 of the old Sardinian code for Piedmont. It will be seen that the present provisions are substantially the same as those of the Sardinian code, so that further comment is unnecessary.

The Right of Aqueduct for Waters of Drainage and for Warping.[1]

(*Sardinian Code, Article 630; Italian Code, Articles 609, 610, 612.*)

The right of passage for waters of natural drainage has always been recognized as a servitude over lower lands, due to their situation; but the right to discharge natural drainage waters on to lower lands at points other than where their original course led them, or to increase the volume of drainage waters artificially, has been the subject of legislation.

Lombardy.—The chief parts of the modern laws of Lombardy on this point were embraced in article 54 of the decree of 1806, which first declared that "lower lands are bound to give passage to waters flowing from higher levels." It will be noticed that this was a declaration of a right of servitude, not only in favor of natural drainage waters, as was the case in other codes spoken of, but it included all waters draining from higher lands, thus including waters which may have been caused to flow down by artificial means, or which had been brought to the lands by artificial works. Not, however, to injure the owners of such estates as might be subjected to this servitude, the second paragraph of this article contains the following provision: Referring to articles 51, 52, and 53, which relate primarily to rights-of-way for waters for irrigation, but are also made to apply to rights for drainage waters, and which contain obligations on proposed conductors of water, to pay for the privilege, etc. This article 54 further says:

"In addition to the obligations imposed by the preceding articles, the proprietor of the upper lands is bound to defray the cost of such drainage channels as may be necessary, and of such works of defense as may be required to protect the lands through which the waters pass; as, also, to repair any damage which at any time the lands may sustain. The preceding article does not affect special agreements between proprietors, nor rights of servitude acquired by process of law."—[See, Smith, Vol. II, p. 158.

This above is an example of most extended application of the servitude of drainage from higher to lower property. Seeing that it includes the right for all waters from the higher estate, whether naturally running off or not, in with those produced naturally, and puts the burden of receiving them upon the lower estate, as a

[1] See, De Buffon, Vol. II, pp. 194–200, and 333; also, Smith, Vol. II, pp. 158, 238, and elsewhere.

natural servitude. In Italian the word *colatura* is used as a name for surplus waters which have been used in irrigation—the drainage waters from irrigated fields; and where rice and meadow lands are cultivated the quantity of these *colaturas* is very large, amounting in some cases to more than half as much water as is originally applied to the land. The right of passage was accorded in Lombardy for *colaturas* upon the same terms as the original waters for irrigation. They were themselves used again in irrigation, and were held to differ in the eyes of the law in no respect from waters directly derived from a primary source, such as a river or spring.

Piedmont.—The following article of the Sardinian code embraced the modern legislation of Piedmont specially applicable to the matter of "The right of aqueduct for waters of drainage and for warping:"

"Article 630. The terms established in the foregoing articles for the passage of water apply equally to the case of the proprietor of a marshy estate, who desires to improve the same either by the process of warping (*colmata*) or by the excavation of one or more channels of drainage. Should opposition be made to the estate by parties having rights to the water on or flowing in any way from the same, the tribunals, in deciding, ought to have due regard to sanitary and agricultural interests, and also to the use made of the water by the objecting parties."

Herein we notice the importance attached not only to drainage, but also to the process of *colmatage*, spoken of on page 91, *ante*, and elsewhere, that they should be placed on the same footing with irrigation in the matter of acquiring right to passage for waters to effect their purpose.

"It is held that the drainage or the improvement, by the process of *warping*,[1] of marshy localities has an influence on the general good of the community scarcely inferior to that of irrigation itself, and that he who is prepared to invest his capital in changing miasmatous swamps into fertile fields is entitled to privileges at least equal to those afforded by the laws to the proprietor of water employed in increasing directly the products of agriculture and industry."—[Smith, Vol. II, p. 268.

The second paragraph of the foregoing article (630) applies to cases where rights to the use of drainage waters drawn from lands in a marshy state, which have accrued by use or otherwise to the benefit of some one situated below, are to be interfered with by

[1] *Colmatage* (French), or *colmata* (Italian).

the owner so improving the estate by more thorough drainage as to intercept, stop, or change the outfall of the drainage waters: and the existence of the law is an evidence of the thoroughness of the system which thus usefully employs in irrigation even the waters of marshes and swampy tracts to an extent that would require and bring about the passage of a special clause in the protection of such rights. The right of way for drainage waters from irrigation (*colaturas*) is also assured by the provisions of this Sardinian code, seeing that the privilege is accorded for all waters to which a legal right is had by the person who desires to conduct them, and seeing that these waters are devoted to re-application in irrigation or some other useful purpose.

The Kingdom of Italy.—In conclusion of this subject of "The right of aqueduct for waters of drainage and for warping," the attention is now directed to articles 606, 609, 610, 611, 612, 637, 654, 655, and 656, Italian code (see appendix II), which contain the relevant matter of the present law, and which are offered in conclusion of the remarks already made under this subheading.

SECTION III.

Right of Aqueduct for Public Waters.

Condemnation for Purposes of Public Utility.[1]

(*Sardinian Code, Articles 441 and 442; Italian Code, Article 438.*)

Piedmont.—Articles 622 to 629 of the Sardinian civil code, as we have seen, provided for the establishment of a right of way for waters through the estates of others. The right to be acquired under these articles was a simple servitude upon the property crossed, and did not give the owner of the canal or water any right of ownership in the strip of land occupied by his work. The application of these principles was intended to provide for cases even of the most insignificant kind—where any one had a piece of land large enough to make a garden patch worth irrigating, and water enough to take to it for the purpose.

In the construction of great works, whether of a private or public ownership, intended to irrigate considerable areas of land, the

[1] See, De Buffon, Vol. II, pp. 333-337; also, Smith, Vol. II, pp. 274-278.

Sardinian government recognized the presence of the element of public utility in the project, and provided in its code for the acquirement, by condemnation, or the exercise of what we term the power of eminent domain, of an absolute property right in the lands occupied by the canal and its necessary accessory structures. The following are the provisions spoken of:

"Article 441. No one can be compelled to cede his property, or to allow another to make use of it, unless for objects of public utility, and on receipt of a just compensation, payable in advance.

"The works of public utility, and the property to be occupied by the same, are determined under provisions emanating from the sovereign.

"The rules to be followed in the aforesaid cases shall be fixed by special laws and regulations.

"Article 442. When the parties cannot agree before the administrative authority on the account of the indemnity to be paid, the disputes shall be decided by the legal tribunals."

Following this, and in 1839, a long special law was passed regulating this matter of expropriation of private property for purposes of public utility, the chief provisions of which are as follows:

"Article 1. Works of public utility are those executed on account of the royal domain, of the State administrations, of provinces, and of communes. Such works, and the property to be taken possession of in the execution of the same, shall be determined under article 441 of the civil code, by letters patent issued under the advise of the council of state.

"Article 2. Works executed by associations or single individuals may also be declared of public utility by appropriate letters patent, whenever their importance or their influence on the development of the general prosperity is such as to warrant this character being attributed to them."—[See, Smith, Vol. II, p. 274.

This law made provision in minute detail for the conducting of the sale of the lands to be occupied by the works: First, prescribing in thirty-seven articles the steps and conditions of procedure when the arrangement could be amicably consummated between the parties, with the mediation of the intendants of the provinces; and then, in twenty-three additional articles, specifying the forms of procedure, etc., to be had before the courts in carrying out the enforced sale, if an amicable agreement could not be arrived at.

The general object was to insure a fair compensation for the ground occupied, and for the injuries or inconveniences occasioned by its use for the purpose desired, to be estimated upon the basis

of the returns from the land for the ten years preceding the date of the proceedings, or on other data equally exact for the purpose.

The first estimates were to be made under the direction of the administrative authorities; but upon appeal to the courts, if demanded by either party at interest, new estimates were made, under the direction of the courts, by engineers agreed upon amicably by the disputants, if possible, or, otherwise, appointed by the court itself.

This law was commented upon and put in operation by a number of administrative regulations, which further explained the forms of procedure to be had and the application of the articles of the law. As to just what construction was to be placed on the term "public utility," the following clauses are in point:

"Whenever the limit of simple private interest, whether in the case of corporate or individual proprietors, is passed, and the work is designed for public service, the declaration of public utility may be claimed without reference to the special nature of the work itself.

"Therefore, canals and ditches, provided they have a material influence upon public prosperity, become included among those works, on behalf of which the declaration of public utility may be made.

"In fact, although the civil code has established certain special rules for canals and ditches, with the view of facilitating their construction by private parties, it does not thence follow, that, when they present all the characteristics of other works of public utility, the benefits secured by the laws to such works should be denied to them.

"It is, therefore, to be concluded that when projected canals have the characteristics of works of public utility, they shall be so declared, with the view of applying to them the provisions of the law on dispossession."—[Trans., Smith, Vol. II, p. 277.

These articles of the laws and administrative regulations so very fully and clearly explain this branch of the subject that comment is unnecessary.

The Kingdom of Italy.—In conclusion of this subject of "Condemnation of right of aqueduct for works of public utility," attention is asked to article 438 of the Italian code, in appendix II, where it will be seen that the law on this point for all Italy is substantially the same as it was for Piedmont under the Sardinian code ruling. In the matter of condemning property for purposes of public utility, the present Italian government has an extended

law which however it is unnecessary here to quote from for the purposes of this report. Its principles follow in the same line as those already so fully noted.

Resumé—Right-of-Way.

To review, in one paragraph, the bearing of all that has been said about the right-of-way laws in Piedmont, it may be said (1), that any person, association, or corporation, having a valid right to any certain amount of water sufficient for and to be applied to a declared useful purpose in agriculture or in the creation of power by water-power works, could acquire the use of the strip of land necessary upon which to construct a canal or other conduit to convey the water from the place of its source to the point of its intended use, as a simple servitude, by observing due forms of demand, paying just compensation for lands and damages in advance, and engaging to so use and maintain his works as to cause no avoidable damage to the owners of the lands traversed; and (2), that when the use of the water was such as to be of public benefit, authority might be had wholly to condemn, pay for, and acquire title to the strip of land necessary upon which to locate the work; and (3), that "public utility" in the case of irrigation meant the use of waters by a number of individuals, a neighborhood, or community of irrigators.

Of this Piedmontese system De Buffon wrote:

"It takes but little reflection to realize that the modern legislation of Piedmont on the subject in question, is as complete and satisfactory as could be desired. Furthermore, the results of it are more convincing than reflection on the laws themselves could be. It may be said that agriculture cannot hope to be more truly and efficiently protected than it is in this country, especially by the facilities which legislation has given for the extending of irrigation."—[De Buffon, Vol. II, p. 337.

In the light of what has now been said on this subject, a careful reading of the provisions of the present Italian law to be found all together in appendix II to this volume, and heretofore referred to by number, will show that the Kingdom of Italy has a most complete and ample Right-of-Way law, and has profited by Piedmontese and Lombardian experience in this regard.

AUTHORITIES FOR CHAPTER XIII.

De Buffon.—[Work cited as an authority for Chapter IX.] See, Vol. II, Book VIII, Chaps. XLII to XLV; Book IX, Chap. XLVII, Div. II, and Chap. XLVIII; also, see Vol. I, Book II, Chap. VII, Div. I.

Smith.—[Work cited as an authority for Chapter IX.] See, Vol. II, Part IV, Chap. I, Sec. 2; Chap. II, Sec. 2, and elsewhere in Vols. I and II.

Sardinian Code.—[Work cited as an authority for Chapter X.] See, Arts. 441, 442, 622–630, 640, 663, and 673.

Italian Code.—[Work cited as an authority for Chapter X.] See, Arts. 438, 598–605, 609–612, 619, 648, and 666, and remarks appended to each.

CHAPTER XIV.—ITALY[6];

IRRIGATION ORGANIZATION AND REGULATION.

SECTION I.—*Irrigation Organization.*
Causes of and Necessity for Organization.
Social Tendency of Irrigation in Italy.
Formation of Irrigation Associations.
General Law of 1803—Lombardy.

SECTION II.—*Organization and Management: Piedmont and Lombardy.*
The General Association West of the Sesia—Piedmont.
General Organization and Management.
The Government and the Association.

SECTION III.—*Organization of Associations: Kingdom of Italy.*
The present Law for all Italy; Civil Code provisions.
Voluntary Association of Landholders.
Compulsory Formation of Associations.
Present Law for all Italy: Special Law provisions.
Organization: Laws of 1873 and 1883.

SECTION I.

IRRIGATION ORGANIZATION.

Causes of and Necessity for Organization.[1]

As heretofore written, the canal works of Italy, for the most part, had their growth in times when only rulers, governments, rich civil and ecclesiastical corporations, wealthy nobles, and large landholders could afford to undertake such enterprises. There was no such thing as companies or associations of small farmers taking water out on their own account for their own use. The river channels and topography and climate of the country were such that the diversion of waters necessitated the construction of great works, built solidly of costly materials, at heavy expense; so there were but few small private canals, and no cheap works of

[1] See, De Buffon; also, Smith and Marsh.

diversion from the natural streams, such as it has been possible to construct and maintain in California.

Then again, the landholdings were much consolidated into few hands in years long gone by, and the practice of irrigation has tended to make the rich richer and the poor poorer—to further increase the size and diminish the number of farms, and reduce the farm workers from the grade of small landholders to those of renters of and laborers on other people's property. Thus, the canals are owned by the government, by wealthy nobles, ecclesiastical and municipal corporations, and very generally not by the irrigators, and the waters are commonly sold by volume according to established units of measure and standards of measuring devices. The lands are generally held by rich non-working owners, and are farmed by irrigation under the management of professional superintendents, or are divided into small tracts and leased, for terms, generally, of nine years duration, to the real working irrigators of the country.

Social Tendency of Irrigation in Italy.

Besides the authors, after whom, in a general way, I have written the foregoing paragraphs, the writings of another deserve special consideration on this point. I quote from a paper written by the late Hon. George P. Marsh, for many years United States minister at the court of Italy, an author of learning, observation, and thought in the special line of the physical, social, and moral effects of man's greater occupations on the earth's surface. Speaking of the effects of irrigation generally in Europe, but from personal observation, more particularly, in Italy, where the paper was written, this author says:

"With an important exception,[1] which I shall notice hereafter, the tendency of irrigation as a regular agricultural method, is to promote the accumulation of large tracts of land in the hands of single proprietors, and consequently to dispossess the smaller landholders."

He then gives some reasons for this, which I shall desire to present in a later part of this report, so will not transcribe them here, but I go on with his narration of the facts to our point:

[1] This exception is in the case of several of the irrigation regions in the south of Spain, where the water rights have been held by the peasant proprietors from the time of the Moors.

"European experience shows, as might be expected from what has just been said, that under such circumstances, as well as where waters belonging to the state are farmed and relet by private individuals, water-rights are a constant source of gross injustice and endless litigation. The consequence of these interminable vexations is that the poorer, or more peaceably disposed landholder, is obliged to sell his possessions to a richer or more litigious proprietor, and the whole district gradually passes into the hands of a single holder, or family, or corporation. Hence, in the large irrigated plain lands of Europe, real estate is accumulated in vast tracts of single ownership, and farming is conducted on a scale hardly surpassed in England, or even on the boundless meadows and pastures of our own west. * * * *

"The small cultivators who sell their paternal acres must either emigrate, and so diminish the resident population, or sink from the class of land owners to that of hired laborers on the fields which, once their own, are their homes no longer. Having no proprietary interest in the soil they till, no mastership over it, they are, as I have said elsewhere, virtually expatriated, and the middle class, which ought to constitute the true moral as well as physical power of the land, ceases to exist and enjoy a social status as a rural order, and is found only among the trading and industrial population of the cities."—[Marsh; see, Report Department of Agriculture, 1874, pp. 364–366.

Although this picture of experience is in a general way true for the irrigation regions of central Spain, of France, of Belgium, and other central European countries where irrigation is practiced on a large scale at some notable localities, it is specially true for Italy and particularly of Tuscany and the regions of the valley of the Po, which we are now considering. With these antecedents and this tendency of canal enterprise and irrigation practice, grew up the gravest conflicts between the irrigators and holders of water-rights—the canal owners. The small land proprietors and irrigators found that singly they could not hold their own: they must organize locally, and, as a body in each neighborhood, district, or subdistrict, treat with those who supplied them with water. This necessity brought about the demand for a law prescribing a form for such organization, and recognition as legally constituted bodies. And, hence, as a modern outcome, we find the law which is next transcribed.

Formation of Irrigation Associations—Lombardy.

The association principle, of which this codification was the outcome in Lombardy in the early part of the present century, is of

quite ancient origin, but its full development in the form we now find it was due to the genius of Napoleon, under whose dictation the original text of the Lombardian law was promulgated. It was a general law governing the organization of land owners, for purposes of drainage, reclamation, or irrigation. And its application, as will be seen, was committed largely to the government administrative authorities.

General Law of Association—Lombardy.

1.—Organization of Associations.

"1. All proprietors interested in special hydraulic works shall be formed into such number of associations as may best suit their common interests and the territorial divisions of the kingdom.

"2. All existing associations shall be preserved, with such modifications or additions as may appear desirable.

"3. The list of associations shall be definitely published during the course of the following year.

"4. The associations are subjected to the control of the prefecture, and shall exercise their functions according to such rules and regulations as may be prescribed by the superior authorities.

"5. The properties benefiting by one drainage or irrigating canal constitute a district.

"6. All the proprietors of estates situated within a district, constitute an association.

"7. If the extent and circumstances of a canal should so require, it may be divided into several sections; each section may have its own district, and each district its own association.

"8. Each association shall be represented by a delegation.

"9. The number of delegates shall be determined by the direction-general, in proportion to the wants of the district.

"10. The proprietors in each district shall elect the members of the delegation by ballot. To this end the prefecture shall convoke the proprietors at a specified time and place. The assembly shall be presided over by the prefect, the vice-prefect, or one of their deputies. If the number absent shall not equal a third of the total number of the proprietors, those actually present shall select the delegates from three lists composed of the larger proprietors.

"11. One delegate shall be removed from the delegation biennially. The retiring delegate shall be selected by lot from among those first elected; afterwards the senior member shall retire. The retiring delegate may be reëlected indefinitely.

"12. The delegation has a president, whose tenure of office lasts for one year. All the delegates succeed to the presidency in due order. Among those first elected, the majority of votes in the election shall regulate the order of succession. Subsequently, the rule of seniority shall be observed.

"13. The delegation shall determine the days of its ordinary meetings. The prefect, the vice-prefect, and the president can, on necessary occasions, summon extraordinary meetings. The president shall cause the decisions of the delegation to be executed in all cases where no special member has been nominated for this purpose.

"14. The ordinary duties of the delegation are to superintend the canals with their outlets and banks, as also the works of such other canals as may traverse or surround their district; to maintain all these in repair, and to collect the funds necessary for these objects.

"15. The delegation shall decide on all matters within its powers by simple majority of votes.

"16. When new projects interesting to the entire district come under discussion—such as the construction of new canals, the enlarging or prolonging of old ones, the formation of outlets or tunnels under rivers, or similar works involving extraordinary outlay—then the whole of the proprietors of the district shall be convoked, and shall proceed to the election of as many extraordinary as there are ordinary delegates.

"17. The union of the additional with the regular delegates forms an extraordinary delegation, which shall decide on the proposed works and the means of executing them.

"18. The result of the deliberations of the extraordinary delegation shall be submitted for approval to the direction-general. On the works and means of execution receiving the approval of the superior authorities, their completion is intrusted to the ordinary delegation.

"19. Each delegation shall have an accountant and a cashier.

"20. In such districts as have relations with foreign powers, the conventions and customs in present force shall continue.

"21. In cases of new canals, or improvements of land by drainage or warping, the districts and associations shall be formed in accordance with the foregoing rules.

II.—Superintendence of Works.

"23. There shall be nominated for the superintendence of the canals, outlets, and embankments, belonging to a district, such number of guards as the delegation may consider necessary.

"24. The delegation shall prescribe police rules for the regular protection of these works.

"25. The ordinary engineer shall visit triennially, and oftener if requisite, all the canals in his department. He shall examine the interior condition of all the fixed works; note their wants, defects, or abuses; propose to the delegation the appropriate repairs; and shall inform the engineer-in-chief of the whole, who will then report to the direction-general. Should the delegation not be prepared to execute the works suggested, the engineer-in-ordinary will report accordingly to the engineer-in-chief, who will

then submit the question to the direction, with his observations and opinion upon it, for the decision of the superior authorities. During such visits the condition of new land improvements should be especially noted.

"26. In times of floods, or inroads of waters, the extraordinary guard reserved for such occasions shall be bound, in operating on any works belonging to any particular district, to act in accordance with the wants and usual customs of the localities.

III.—Works on Canals of Drainage.

"27. With the view of showing clearly the interior condition of the principal canals, fixed marks shall be established at every fourteen hundred feet along their banks, on which shall be shown the depth that each section of the channels ought to have. This depth shall be shown in local measures, with the equivalent Italian measures, on each of the marks above referred to.

"28. Each delegation shall fix a certain minimum depth for each canal within its district; and when silting up above this plane takes place, recourse should immediately be had to excavation. The depth in question should be approved of by the engineer-in-chief.

"29. The clearances of the canals should be effected twice a year at least.

"30. Should it happen that, by any river breaking its embankments, portions of canals are blocked up, the delegation should instantly reëstablish the same.

IV.—Disbursement and Collection of Funds.

"31. A preparatory estimate of the expense required for the public and communal canals included within a district shall be made by an engineer or other qualified party. The same course shall be followed in all cases of extraordinary works.

"32. The delegation shall prepare annually an assessment list, the basis of which shall be the amount of annual public burdens on each property, and the estimates of the probable expense required for the works, as given by the engineer.

"33. This assessment list shall be submitted for the approval of the prefect, who shall forward the same for the consideration of the magistracy of waters. On receiving the sanction of the preceding parties, the assessment shall be enforced according to existing agreements and customs.

"34. Where no special agreements or common customs exist, the proprietors subject to the assessment shall be arranged in different classes, according to the amount of benefit they derive respectively from the works.

"An engineer-in-chief, selected by the president of the delegation, shall propose the classification of the proprietors and the different proportions in which the separate classes shall contribute to the expenses.

"This proposal shall be made public, so that the proprietors may present any objections that they may have to it, before the provincial delegation within a term to be fixed by this body. The provincial delegation, with the concurrence of the provincial assembly, shall report on the case to the government. On receipt of the approval or alterations of the superior authorities, the quota fixed for each class of proprietors shall be distributed among the individuals composing this class, in proportion to the revenue survey valuations of their respective properties.

"35. In collecting this assessment the cashier shall exercise the same powers as are prescribed by the laws for the collection of the direct taxes.

"36. The fines imposed on parties breaking the existing regulations belong to the association, and shall be deposited in the treasury of the same. Whatever profits may in any way accrue shall be similarly deposited in the treasury, at the disposal of the delegation.

"37. The cashier shall make payments on orders signed by the president, one delegate, and the accountant. He ought to be required to furnish a sufficient amount of security. He is appointed by the presiding body, on its own responsibility. The entire amount of each rate imposed shall be placed to his debit five days after it has become due, whether it has then been received by him or not.

"38. At the end of each year the superintending body shall present to the provincial delegation the accounts of the expenditures, with a statement of the debits and credits of the treasury; and when these have been approved by a vote of the provincial assembly, they shall be published, and a copy forwarded to the government.

"39. In case of several channels, which cannot conveniently be included within one district, having a common escape-canal or other works, the expense required for the protection and maintenance of the said works shall be divided among the districts using them, in proportion to their respective interests in them, excepting always any agreements in force to a different effect.

"40. If the defense of an embankment concerns several districts, the expense of repairing it shall be divided among them according to their respective interests, saving agreements in force to the contrary.

V.—General Provisions.

"41. Associations of proprietors interested in drainage, land improvement, or irrigation, are subject to the inspection of the provincial delegations, and are placed under the guardianship of the political administrative authority. They exercise their duties according to the rules and regulations prescribed by the superior authority.

"42. All works appertaining to associations shall be made by

regular contracts. To proceed otherwise, and to execute the works by daily labor, requires an express order from the government, who will decide on the case and the necessity. In contracting for the annual repairs of the works the contracts shall be made for nine years. The government may alter this arrangement under special circumstances.

"43. The channels shall be furnished, not only with the appliances necessary for opening or closing them with facility, but also with supplies of all the materials which may be required to strengthen and protect them in time of floods. All arrangements that concern the defense of embanked rivers are under charge of the engineer-in-chief and his subalterns.

"44. Where the respective titles do not otherwise provide, the volume and the special regulations for each outlet from the rivers shall be fixed in such manner as that no injury may result to the interests of any of the proprietors belonging to the district. The same care shall be observed in the use of turbid waters employed in operations of improvement by deposits.

"45. Objections made by the proprietors within a district to the proceedings of the presiding body shall be considered by the provincial delegation which, having verified the facts and submitted them to the provincial council, shall decide each case according to its merits. If the objections should involve points of great importance, the provincial delegation shall submit them to the government, and shall await its instructions before coming to any decision.

"46. Each delegation shall present to the provincial delegation a project of regulations for the careful protection of all the matters committed to its charge. These regulations shall not have force until approved of by the protecting authority."—[Smith, Vol. II, pp. 170–178.

SECTION II.

Organization and Management of Irrigation Associations.

The General Association of Irrigation west of the Sesia—Piedmont.

To illustrate the application of the formation of irrigation societies in Piedmont, I bring forward the special case of the organization and operation of the General Association of Irrigation west of the Sesia. As already written, all of the canals, of which there are quite a large number, in a certain great district east of the Po and between the Dora Baltea and Sesia rivers in Piedmont, were the property of the government. These were managed and maintained, as explained in the preceding chapter, under the direction

of a bureau of civil engineering attached to the ministry of finance; but the waters were farmed out on leases to contractors who undertook to distribute them to the irrigators, collect the rents, and pay the government specified sums annually. The arrangement was thus written of in 1855:

"In the hands of the farmer of the canal revenues, are vested the powers of entering into the contracts for water with all cultivators—of fixing in communication with them the annual rent to be paid, and the manner in which the supply of water is to be used and measured. In a word, the whole interior economy, so far as the granting of water is concerned, is under the control of this party, who has his own private agents spread over the country to watch his interests and carry into execution his orders, all disputes being submitted to the decision of the ordinary tribunals."—[Smith, Vol. I, pp. 119–122.

In view of this state of things, and remembering the matter upon this special point—the effect of irrigation industry on landholdings—transcribed from the writings of Marsh, in the first section of this chapter, we see the incentive to organization of the irrigators of this region, and are prepared to appreciate the importance of their association, which was formed for the purpose of doing away with the evils of the system of water-leasing by government to contracting "middle-men," and re-leasing or selling to the irrigators. The general idea was the formation of a society composed of all the irrigators, themselves to lease the waters in bulk from the government canals, and distribute them to themselves as irrigators.

The society was founded by government under the act of July 3, 1853, and owes its origin to count Cavour, at the time minister of finance of the Sardinian government, and a man to whom, on account of his liberal and advanced ideas and patriotic actions, northern Italy looks as a benefactor. The organization had for its object at starting, "to lease, administer, and employ in general, according to an economical and natural system of irrigated cultivation, the waters of the crown canals derived from the Dora Baltea (river), in terms of the agreement made with the state finance bureau, for the irrigation of the respective properties of the shareholders, with the power of extending successively the benefits of the association, even to the mutual assurance against losses by hail, fire, and such like, and to other social objects of mutual profit."

By the agreement referred to, the government leased to the association all the waters, in volume about 1,750 cubic feet per second at maximum flow, of the crown canals in the region spoken of, which is about twenty miles square, for a period of thirty years; making, however, certain reservations in favor of owners of old rights long ago acquired in perpetuity, which reservations amounted to an aggregate volume of 793 cubic feet per second. The lease took effect on January 1, 1854, expired the first of the past year (1884), and has been renewed on substantially the same terms.

I have made and hereinafter present an analysis of this agreement, but now ask attention to an account of the organization and internal working of the society. The statutes and regulations of the society comprise three hundred and seventy-nine articles, covering seventy-six pages octavo. The following is an abstract of the principal points contained in these:

Organization and Management of the Association.

"In each *commune*, or parish, irrigated by these canals, there is a society termed a *consorzio agrario*, composed of all the proprietors within the parish who take water for their lands; or in certain cases a *consorzio* may be composed of proprietors of adjoining small parishes. Each *consorzio* elects by universal suffrage one or two deputies, according as it uses a discharge of less or more than 30 modules (61.4 cubic feet per second) in its irrigation. These deputies form an assembly for the general administration of affairs. They must be themselves members of the society, over twenty-five years of age, "sufficiently acquainted with agriculture," and men of good character. They receive no salaries as deputies, nor are they allowed to hold any paid office under the society. They are elected for three years, and may be reëlected. They meet regularly twice a year, on the fifteenth of March and fifteenth of November, and half their number form a quorum. They elect from among themselves a president and vice-president, whose functions last for three years, and each year they choose also an honorary secretary and two assistants. They pass the accounts of the year, settle how much is to be paid by each *consorzio*, what salaries their employés are to have, listen to suggestions for the benefit of the society, and in short generally direct and control the whole of its business. The rules passed by the assembly are binding on all the members of the society. To help them in forming decisions they have a legal and an engineering adviser.

The Direction-General.

"From among themselves the assembly elect three committees: the direction-general, the committee of surveillance, and the council of arbitration.

"The first is the committee of management of the affairs of the society. It consists of a director-general, three members, a secretary, and an assistant secretary. If the director-general likes he may appoint a colleague, with the approval of the assembly, to take his place in case of illness or absence. The director-general may call on the assembly to dismiss any of the members of his committee, or he himself may suspend them for not doing their duty. He has in every way to watch over the interests of the society, to see to the conduct of its servants, and to give them rules for their guidance, to direct any works, to disburse expenses, to arrange with the government (or with the canal company) for the amount of water required at each point, to see generally to the distribution of the water over the irrigated district, to carry on all communications with the government, and in short to be general manager. The director-general receives an allowance of $1,800 a year, from which he is expected to pay a number of small charges; and each member of his committee receives a certain salary. This committee has its headquarters at Vercelli, and renders an account of its proceedings at each meeting of the general assembly.

"The committee of surveillance is 'the eye of the assembly over the direction-general,' and has to see that it carries out faithfully its duties towards the society. It consists of three members, of whom the oldest presides. They meet once a week, and each time receive a ticket which entitles them to a small allowance as fixed at each general assembly; in 1866 the whole amount being only $170. Should they think necessary, they may call an extraordinary meeting, and make a report of their proceedings.

The Council of Arbitration.

"The council of arbitration has for its object: 'first, to settle all disputes regarding affairs of the society which may arise between the members and the society, or between the society and its servants; second, to decide cases of breaches of the rules and discipline of the society; third, to assist the society in actions before the courts; fourth, to give their advice on whatever may be referred to them by the director-general; fifth, to fix and settle in case of dispute the compensation for the passage, outlet, or any other obligation or damage occasioned by the flowing, distribution, employment, recovery in drains, and escape of the waters of the society, with its members or among the *consorzios*, or members with each other.' This council is composed of three members of the assembly, who must be resident in Vercelli, and are elected annually. They receive no regular pay, but get certificates of attendance at meetings, like the committee of surveillance, and these certificates

entitle them to a small remuneration, of which the whole amount in 1866 was $243."

Their decisions are made by vote of the majority. There is always the power of appeal from them to the ordinary courts of justice; and to admit of this appeal, the execution of sentences is deferred for fifteen days after being promulgated, unless in cases where, for the sake of the crops, it must be carried out at once. After fifteen days, if no appeal has been made, the decisions of the council are looked on as final. When necessary the council summon a lawyer or an engineer to their assistance. All charges of this council are paid by whoever loses the case. The director-general is not allowed to carry on any lawsuit on the part of the society without the previous sanction of the council of arbitration.

Finance and Superintendence.

"The money transactions of the society are under a cashier, who has to give a security for $4,000, and who is responsible for all connected with the cash. His chest has three keys, of which he keeps one, the director-general another, and the third is held by the largest shareholder of the society who is a member of the general assembly and happens to live in Vercelli. Money is issued on the checks of the director-general, and once a month he and the member who keeps the third key of the cash-box count the cash, and audit the cashier's books.

"To effect the distribution of the water, the area irrigated is divided into a certain number of districts (at first only four but increased since), in each of which there is an overseer in charge of the irrigation, termed the *delegato*, who receives his orders from the director-general, and several guards or water-bailiffs, termed *acquaiuoli*. These officers patrol the water-courses; see that the modules are discharging their proper amount; that the water that passes off the fields is not running to waste, but is caught in the catch-water drains, from which at a lower level it can be again utilized (a point attended to with admirable care in the Piedmontese irrigation), and do all the other ordinary duties connected with their position. Neglect of duty or disobedience of orders subjects them to fines, reduction of salary, or dismissal."—[Moncrieff, pp. 230–234.

The Government and the Association.

An Analysis of the Lease of Waters to the "General Association of Irrigation West of the Sesia," Piedmont, 1884.

For the purpose of bringing out as clearly as possible the relations existing between the government and this great irrigation

association, I have made an analysis of the agreement between them, and, doing away with superfluous verbiage, have brought the essential points together under the headings which have seemed adapted to the matter and calculated to convey the best idea of its scope and bearing, as follows:

Water Rights and Privileges.

The government granted to the association, for a period of thirty years, the exclusive right to the use and control of the waters of the three large state canals, Ivrea, Cigliano, and Rotto, derived from the Dora Baltea river, to the extent of such volume as might be necessary to properly irrigate the districts of Vercelli, Casale, and Biella, wherein were situated the lands owned by the members of the association. At all times the volume of water to be delivered was to be limited by the total capacity of the canals, which was 870 modules, or 1,750 cubic feet per second, and by the previous engagements of the state to deliver, of this amount, 387 modules to holders of old grants-in-perpetuity of water-rights.

The supply of water furnished was to be negotiated for each irrigation season in advance—the summer season being held to commence with the spring equinox and end with the autumn equinox, and the winter season to embrace the balance of the year—and, with the exceptions noted, the supply during each such irrigating season was to be delivered by the three canals in proportion to their respective capacities, and maintained at a steady flow equivalent to the amount engaged. During the summer—the season of abundant supply and the season of greatest demand—the volume delivered was to be governed by the demand of the association made before the thirty-first of January preceding, and by the limitations already spoken of.

The government reserved the right of closing the canals for necessary repairs according to custom during the spring and before the first of April, at which date, unless some extraordinary obstacle or reason prevented, the waters were to be let in. With this special exception, and the general exceptions which follow, during the term embraced by the winter season water was to be kept flowing in the Ivrea canal to a depth of 4.6 feet, in the Cigliano to a depth of 4.3 feet, and in the Rotto to a depth of 2.6 feet, according to the official gauges in the canals respectively; and the amount thus conducted was to include the winter supply due the old grantees of water-rights as well as that at the disposal of the association.

Should it become necessary at any time during the year to execute extraordinary repairs to either of the canals, or the headworks in the river supplying them, the association was obliged to suffer the loss of water for the time, without claim to rebate on its payment for the season. Should the supply of water in the river at any time fall short of the amount sufficient to supply the flow demanded, the deficiency was to be divided between the canals in proportion to their summer volumes of flow, and be borne by the association without recourse for loss.

The state was restrained from issuing privileges to any other person or association, for the diversion of water from the Dora Baltea or Po, for irrigation in either of the three districts included within the area to be served by this association. The state reserved, however, the right of using the three principal canals, or either of them or the secondary branches, for the irrigation of other districts, provided this could be done without diminishing the supply required by the association. The state also reserved the right of collecting the surplus drainage waters from irrigation, below the lands of the members of the association, and of re-disposing of them for irrigation in the lower district of the Lomellina.

The water was leased to the association for the use of its members, and not for sale to persons not members, and except in cases of urgent demand when a casual watering might be given the lands of some outsider, the association was prohibited from taking more water than its members required, and from delivering it to others than members for use. In the event of the government authorizing or causing a canal to be built from the river Po, so as to command the districts to which the agreements related, the association was to have the privilege of taking the waters of the Po, in place of those of the Dora Baltea, at an advanced rate of payment, as elsewhere spoken of.[1]

Management of the Waters and Works.

The management of the diversion of the waters from the rivers, and of the upper portions of the canals down to the point of gauging in each, was to be wholly in charge of the government agents; the gauging was to be in charge of the government engineers, and thenceforward in the canals the association was to take charge of the flow of the waters and their distribution, except as might be

[1] Such a canal was afterwards built, as will be shown in the next chapter.

necessary in effecting repairs to works, as will hereafter be seen. The unit of measurement in the distribution as well as the original delivery of the waters, was to be the *module* defined and legalized by article 643 of the (Sardinian) civil code, and equivalent to 2.047 cubic feet per second. The association was to apportion and deliver to the holders of the old water-rights the quantities of water due each, to the aggregate volume of 387 modules during summer, as they had been delivered in the past, and according to a schedule annexed to the agreement. Should the association fail to deliver these waters, the state reserved the right to take charge of the works, and deliver them.

The state, at its own expense, was to preserve and protect the three principal canals and all structures immediately connected with them. The work of ordinary maintenance and repairs, on all irrigation works, was to be performed by the agents and engineers of the state, yearly, at the expense of the association. The state assumed the responsibility of managing the main works only to an extent sufficient to deliver the waters at the points of main distribution. Beyond that, the association was to conduct the operations and bear the expense of every kind necessary for delivering, distributing, and employing the waters leased, and also the expense of maintaining proper drainage facilities to save the surplus waters after use.

Water-Power.—Revenue and Rents.

The state also accorded the association the use of the royal establishment and mills of Salasco, to be used by it in the administration of the works, and in cleaning and handling the grain, rice, and other produce paid by the irrigators for water rents. The society was to keep the establishment in repair, and be responsible for loss by fire or otherwise. The water-power of the canals, beyond that necessary for the above named establishment, and beyond that necessary for the existing or new mills of the members of the association, devoted for their own private use, was reserved to the state. [The introduction of new machinery into the Salasco establishment by the state, and its use by the association, was also the subject of articles of agreement, but these it is unnecessary to summarize here.]

The annual dues from the holders of old water-rights were to remain as before, payable to the state. All other income from the

use of the waters delivered to the association, except that which might be derived by the state from the use or disposal of water power, as elsewhere explained, was to be to the benefit of the association. The association was accorded full power to fix its rates for water to be delivered to its members as consumers. In return for the use of the waters, the association was to pay the state for the water used by it during the summer season, at the rate of about $80 per cubic foot per second. Payment to be made before the thirty-first of December of each year, and to be collected the same as taxes.

General Conditions.

All the waters, rights, etc., were turned over to the society as they existed, the society assuming all responsibility in their management, except as stipulated to the contrary in the agreement; and only in the case of their proving profitless by reason of absolute failure of water, or a raging plague, or a war being waged in the locality, could the association have recourse against the state for a remission of its dues. The state by its engineers was to prepare and cause to be published at the joint cost of itself and the province of Vercelli, a hydrographic map in detail of the whole region covered by the agreement. The state reserved the power to appoint a special commissioner to represent it in the councils of the association, and to care for its interests generally under the agreement. This commissioner was not to have any vote in the assembly or syndicate, but was simply to have a voice to speak for the state when necessary. The association was required to deposit a money bond equivalent to about $60,000, to be held by the state as a guarantee of the good faith of the association and the payment of its dues. But for the first year the association was to be permitted to use this sum for working expenses if necessary; or in after years in case of great necessity, of which the state administration was to be the judge, and upon an agreement made at the time to return it within a limited period. [There were other provisions about the extension of the works by the state, and the use of such new works by the association, which it is unnecessary to summarize here.]

SECTION III.

Organization of Irrigation Associations.

The Present Law for All Italy.

The Sardinian code did not contain any provision for the formation and management of irrigation associations. A law similar to that of the former kingdom of Italy, promulgated at the order of Napoleon, and hereinbefore transcribed as the law of Lombardy, made such provision in detail for Piedmont, and, as we have seen, the great irrigation association of the country was recognized by a special law sanctioning the lease of the waters of the crown canals to be used under its management.

When, in 1865, the code for all Italy was formed, however, there was incorporated in it a number of articles which declared the liberty and power of forming associations, specially for such purposes as irrigation and drainage, and formulated the principles to be observed in the management of their affairs. These are to be found in articles 657 to 661, inclusive, under the title, "In what way servitudes are to be exercised," and in articles 673 to 684, inclusive, under the title, "Of community of property." (See Appendix II.) I write from these rulings an abstract which is presented under the two subheadings next following:

Voluntary Association of Landholders.—Civil Code, 1865.

Where in a natural irrigation, reclamation, or drainage district, a community of interest exists such as to clearly render coöperation amongst the landholders advisable, in order to effect the desired purpose of irrigation, reclamation, or drainage, as the case may be, these owners may form an association to jointly act in the matter. For such free association it is only necessary that the assent of the members be had in writing, and that the by-laws under which they propose to operate be similarly recorded. (Art. 657.)

Such organizations are governed by the action of a majority of their members, who represent at the same time a majority interest in the property entered and benefits of the association. Thus, to constitute a majority there must be, not only more than half of the parties at interest, but these parties must represent more than

half of the total property interest signed for in the association itself. (Arts. 658 and 678.)

The resolutions and determinations of such a majority are binding upon a dissenting minority in the association. Assessments may be levied, which become a lien on all the property represented in the association, and collectible the same as taxes. If at any time a majority, as already defined, cannot be had for or against a proposed measure, or if the determination of a majority may threaten detriment to the interests at stake, the judicial authority of the province may look into the matter, and, if necessary, appoint some one to administer the affairs of the association. (Art. 678.)

No one can be compelled to remain a member of such an association; but lands which have been entered as being represented cannot be withdrawn during the period for which they are entered, up to a limit of ten years. Thus, any person joining such an association is admitted as the representative of his certain specified property in the district, and thereupon is entitled to representation as an individual, and also as the owner of a certain interest, proportioned to the whole as may have been agreed on. He may thereafter himself withdraw; he may sell, lease, or hypothecate his interest to others, who may represent it in the association, or he may leave it without representation; but the property itself is held to the agreement for at least ten years, unless the judicial authority, on due hearing, may be shown the justice of releasing it. (Articles 681 and 679.) Furthermore, no individual owning a part of a property thus joined in common interest can be allowed to withdraw, even by the courts, if the part so withdrawn be such as to defeat the purpose of the association. (Art. 683.)

Each individual member of such an association may proceed against each other individual member, and compel him to contribute his share towards the proper maintenance of their common interest, unless the directory of the association releases those proceeded against, or they release themselves by an abandonment of their interest. (Article 676.) But no individual can make any change in the property owned in common, no matter how much to the advantage of all it may appear to be, unless the others consent. (Article 677.) The proper preservation of a common interest does not necessarily imply a change, however; so that each individual can be held to sustain the acts of every

other individual associate, wherein it can be shown that such acts are necessary for the preservation of their joint interest.

Such an association can only be dissolved at the end of the time for which it was formed, or by resolution of a majority exceeding three fourths, or when a dissolution may be effected without serious detriment to the interests involved. In the first case, when such associations are formed for definite periods of time, the fact of formation binds all the property for that time; and, hence, until its expiration, except in the cases which follow, the association cannot be dissolved. In the second case, the majority required is not only more than three fourths the individuals of the association, but, also, a representation of more than three fourths the interest involved. In the third case, the question—as to serious detriment to interests involved—is always to be decided by the courts; so that, an association being formed, to dissolve it before the time, an application has to be made by parties interested, and the courts have to be shown that no interests are to suffer by the dissolution, before it will be authorized. (Article 660.)

Compulsory Formation of Associations.—Civil Code, 1865.

The foregoing embodies the general idea of a free association, where all the parties voluntarily join in the movement. But the law does not stop here: We find in article 659 that the "judicial authority"—that is, the judges of the superior court of the province (an appeal being open to a higher tribunal)—"when it is a case of the exercise, the preservation, or the defense of a common right, of which it is impossible to make a division without serious injury," may order the formation of an association of all owners of lands in any such district, when a majority of them shall have demanded such organization, and the others shall not, on being heard, have been able to show good reason why the action should not be taken.

Now, "a case of the exercise, the preservation, or the defense of a common right, of which it is impossible to make a division without serious injury," may be presented in an irrigation district, and it is almost always presented in a drainage or reclamation district. These points are judged of by the courts, and, as I have in several places heretofore explained, the courts are guided in their decisions on such matters by the opinions of engineering experts, limited in number under the orders of the courts, nominated by agree-

ment, if possible, amongst the parties interested, or, in default of such agreement, then appointed by the court itself.

Here, then, we have a result: Where a community of interest exists in a district of country such that in order to manage its irrigation or effect its reclamation or protection from floods, it is necessary, in justice to all owners and each parcel of property, that all combine in an association for the common protection or the exercise of a common right, if a majority of the owners of the property, representing a major part of the property owned, make application to the proper tribunal to have an order issued for the purpose, and, after a due hearing of all parties, it appears to the court that the interests should be combined, an order will be issued compelling such combination. The minority can be forced into the association; and, being in, as we have seen, the minority are subject to the rulings of the majority; but in the cases where associations are thus formed under orders of a court, the resolutions of the majority are subject to revision by the court. (Art. 659.)

Here we find a rule parallel to that which we have before noted as an established principle in France. The principle of compulsory action where an interdependence of interest clearly demands it in order that a common good may be subserved. As has been said, reclamation districts almost always present such cases. The French apply the rule only in cases where "the water is an enemy." The Italian law is somewhat broader in its wording, so that a proposed irrigation district, even, might present the conditions which would warrant the compulsory association of the owners of its lands, on the petition of a proper majority of them.

Irrigation Organization—Law of 1873.

In 1873 was promulgated a special law concerning irrigation associations, which supplements the provisions of the civil code, already given and discussed, and fills a space in the subject of public works legislation not treated of by the general law of March, 1865. Chapter IV of title III of this public works law which has already been written of, related to associations for artificial drainage of lands, but there was not any provision specially relating to irrigation associations. The law of 1873 was intended to supply this deficiency. It is substantially as follows:

The provisions of the civil code, articles 657, 658, 659, 660, and 661, are made the basis of the system. Every irrigation associa-

tion is required to specify in its regulation or ordinance, made necessary by civil code, articles 657 and 659, the exact extent and limits of the land that it proposes to irrigate, the means whereby it is intended to provide for the undertaking, the conditions of admission of its members, the manner of its administration, and the powers assigned to its administrative officers. The responsibility of members is limited to the amount which each pays into the society, or which is determined in the ordinance adopted. Associations may specify in their ordinance means or methods of arbitration between members and between members and the association, but the right of appeal to the ordinary courts is reserved. Associations which can show that the area of their irrigated lands exceeds 20 *ettari* (about 50 acres) may by royal decree be accorded the power and privileges of the official tax collecting system to collect the contributions of members. The official fees on documents filed by irrigation associations within four years of their organization are practically abolished. The increase in the value of lands consequent upon the construction of works and irrigations by associations formed under this law, and comprising more than 20 *ettari* in area, is exempted from taxation for thirty years. Communities and provinces which, either alone or associated with other provinces or with private individuals, undertake works of diversion and utilization of public waters, are accorded the privileges and favors of the present law, and existing associations are preserved and protected.

Irrigation Organization—Law of 1883.

Finally, in 1883 the last law relating to irrigation associations was enacted as a supplementary enactment to that of 1873. Its provisions are substantially as follows:

Irrigation associations formed after the promulgation of the present law must have as a part of their constitution a regular schedule of all the lands to be irrigated, and this schedule must be continuously kept corrected to date as modifications or changes may be made. In cases wherein no description by metes and bounds is at hand, a topographical description and an outline sketch of the tracts may be temporarily substituted. The royal government is authorized to establish by decree the regulations and forms according to which these schedules are to be made. Associations are granted further privileges for the collection of as-

sessments by the government tax collecting organization. All lands within the perimeter of the associated district are subject to the servitude of right-of-way for works of the association, but the right of appeal to the courts for the decision of special points is reserved.

The financial bureau of government is authorized to make loans to irrigation associations. The minister of agriculture is authorized to offer premiums and other substantial rewards and encouragements for examples of irrigation practice by associations and communities, and also for works of storage, new works of diversion, and canals to conduct water for irrigation. Under certain conditions the same offers may be made to private individuals in competition. Diversions of water greater than 30 *modules* are ranked as first class; those less, as second class.

AUTHORITIES FOR CHAPTER XIV.

Moncrieff.—[Work cited as an authority for Chapter VII.] See, Chap. XV, and Appendix D.

Smith.—[Work cited as an authority for Chapter IX.] See, Vol. II, P. IV, Ch. I, Sec. 5; Ch. II, Sec. 5, and elsewhere.

Marsh.—"The evils, remedies and compensations of Irrigation;" by Geo. P. Marsh (U. S. Minister to Italy). See, Report, Department of Agriculture, 1874, pp. 362–381.

Italian Code.—[Work cited as an authority for Chapter X.] See, Articles 657–660, and 673–684.

Laws and Regulations.—Law concerning Associations of Irrigation, passed March 29, 1865; also, Law supplementary to the above, and concerning the extent of Irrigation Practice, passed December 25, 1883; and Circular to Prefects, issued thereunder. Comprised in a collection of Laws and Decrees received from the Hon. Minister of Public Works, Italy.

CHAPTER XV.—ITALY[7];

IRRIGATION ENTERPRISE.

SECTION I.—*Forms of Enterprise—Examples of Canal Construction.*
The Association Principle not Applied.
Ancient and Modern Enterprises.
The Great Modern Work—Cavour Canal.
Organization—Management—Failure of the Company.

SECTION II.—*Concessions to Capitalized Companies—Cavour Canal.*
The Cavour Canal Concession.
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Privileges to the Company.
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SECTION III.—*Governmental Policy and Encouragement.*
General Policy as to Public Works.
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Competition in Irrigation Enterprise and Practice.
Hydrographic and Agricultural Surveys of Italy.

SECTION I.

Forms and Examples of Canal Enterprise.

The Association Principle Not Applied.[1]

Although, as I have endeavored to show in the chapter preceding, the principle of association has long been very fully developed and applied in northern Italy, in the matter of organization for the use of water in irrigation, it has not until quite recently been thus availed of for the management of enterprise in main canal works. The property owners, both poor and rich—the peasantry and gentry, and even the nobility—have participated in the formation, and now maintain the organization of associations, over almost all irrigated Lombardy and Piedmont, having for their

[1] See, De Buffon, generally; acknowledge, also, letters from Hon. Geo. P. Marsh.

object the leasing in bulk, and distribution among their members, of the waters of the canals. But the canals themselves are almost without exception the property of the state, of municipalities, of ecclesiastical bodies, of corporations, of (in each instance) a few rich and powerful noble families or wealthy landholders.

The association principle, of which I speak, in northern Italy, was born of and derived its strength from the necessities of the people for protection: on the one hand, protection from the floods of water which, spreading out from the great rivers, have so frequently devastated the lower parts of the fair valley of the Po; and on the other hand, protection from irrigation water monopoly which long ago implanted on the higher lands, spread its blighting influence even more widely than did the floods theirs.

It was early realized that association, unification of effort—if not voluntary, then by compulsion—was absolutely necessary in the low lying districts, in order to compass a respectably efficient resistance to the spreading of the army of flood waters which the Alps and the Apennines periodically sent forward towards the sea. The march of these floods was just as much an invasion of the country as was the advance through the fields of any of the armed and ruthless hordes of men, which northern and middle Europe have so often in historic times sent trooping over the plains of the basin of the Po.

As organization was necessary to resist the human flood (but, alas, Italy, because disorganized, has not always effectively interposed such resistance), so united effort on a broad scale was necessary to control the over-running of waters, in this same country. That the object of this organization has not always been accomplished is a matter which need not concern us here. The facts are recognized, that many thousands of acres of a most productive country have been cultivated for centuries, under the protection of works controlled and maintained by district organizations of the people, under government supervision, that the country could not have been inhabited otherwise than by successful defensive war against the invading armies of waters, and that experience shows the general scheme of organization, and operation, so far as the political problem goes, to be the best ever adapted to a measurably free people; and we can well understand its increased degree of adaptability under social and political conditions grounded on an advanced position of freedom and intelligence of the masses.

Commencing, probably, in this necessity for protection against

floods, associations of landholders in districts were formed for protection against the exactions of the owners of the waters and rights to use waters in irrigation on the higher lands; and the very fact of the application of the principle of this form of organization being made all over the country for the purpose of unifying in districts the interests of the many irrigators, and thus treating for and managing the waters, is sufficient proof of the antecedent fact of the necessity for such action—a necessity founded in the fact of the ownership of the canals and waters by those who did not themselves use or personally direct their application.

As a natural consequence of this turn in events the proprietors of the canals have themselves organized in the several districts, and great clashings and conflicts of interest have resulted; but when opposing interests are thus locally organized they are easier to deal with by third parties, and so the government as the mediator in this instance, and through these organizations formed under general laws, exercises that supervision which now keeps comparative quietude and admits of a corresponding degree of prosperity.

Canal Works and Enterprises.[1]

With very few important exceptions, the main canal works of northern Italy were built so long ago and under political and social conditions so different from those which are present in our country, and even in Italy at this day, that we find but little of a positive nature, in the forms of enterprise under which they were carried out, by the study of which we may profit. There was, at the dates of early works, no legislation with respect to irrigation enterprise, and no administration worthy of the name. The following notes will convey an idea of the origin of the great works of the country:

Lombardy.—Eleventh century—Ancient works of the Romans in and about Milan, restored and extended.

Twelfth century—Further extension of these works. The monks of Chiaraville obtained rights to the waters of the Vettabbia, and utilized them. Construction of the great canal of the Ticino; of the canal of Battaglia, and of Reno, and of many others. This was a period of great activity in the construction of works.

[1] See, De Buffon, Vol. I, Ch. I, and, also, pp. 123, 134, 153, 162, 180, 195, 227; also, Smith, Vol. I, pp. 100–102, and 196–202.

Thirteenth century—The grand canal—Naviglio Grande—even yet the largest in Lombardy, was completed. The canal Muzza and other great works carried out.

Fourteenth century—The Naviglio Cavico, deriving its supply from the Oglio, constructed. The great canal from Pavia to Milan built.

Fifteenth century—The canal Martizana commenced and finished within a few years—an exceptional case. The canal Bregnardo also promptly carried out in a reasonably short time.

Sixteenth century—The great lines of irrigation were extended, and many minor and secondary works built. The canal of Paderno, the only main work of importance, commenced; but it was not finished until late in the eighteenth century.

Seventeenth century—Dominion of Spain over the country from the last century. Great activity in irrigation works of detail, and systemization of practice; but no new large works.

Eighteenth century, and to the middle of the nineteenth—No new large works of irrigation in Lombardy, except the new canal of Pavia, executed in the time of the former kingdom of Italy, in the early part of this century, by order of Napoleon.

Piedmont.—Fourteenth century—Most ancient existing important canals built. Early part of century: The Roggia or Gattinara canal built. The canal Busca and Santirana, from the Sesia, and the canal Langosco, from the Ticino, built in the latter part of the century.

Fifteenth century—The canals Rotto and Dorea, from the Dora Baltea, built. Also, the canals Commune of Gattinara, Mora, and Sforzesca, had their origin in this period.

Sixteenth century—The only important work due to this century, in Piedmont, is the canal Coluso.

Seventeenth century—The canal Ivrea restored, after having been destroyed.

Eighteenth century—The canal of Cigliano, with its branches, was constructed.

Nineteenth century (early part)—The canal of Charles Albert constructed.

With one important exception, which is to be written of in the next paragraphs, the canals above named constitute almost all of the important works in the great irrigated region east of the

Po, and supplied from its tributaries, for although there are very many secondary and branch canals, and an immense number of distributaries, the main works are not numerous but large. The topography of the country has not admitted of cheap works, and the early policy of the government did not encourage opposition enterprises.

The Great Modern Work—Cavour Canal.[1]

Remembering what has been said in the introduction preceding the ninth chapter of this report, about the form and size of the valley of the Po and the distribution of its water-ways, we are prepared to see at once the bearing of the Cavour canal problem. There had been a number of canals brought from the rivers which enter the valley of the Po from the Alps and course across the great plain of Piedmont to the main stream running easterly at its foot, but previous to 1844 the idea of calling upon the Po itself to contribute a portion of its waters to this field of irrigation industry, it appears, had not been seriously entertained. The probable great cost of the work had deterred even an examination of the project, so it was not fully realized until about the date mentioned, that the scheme was financially feasible.

A canal on this route would have to cut across the natural drainage lines and, also, other canals of the country, and these were so formidable as obstacles to a great artificial water-way, that it probably appeared in capacity to be an undertaking beyond reach. It was as though a canal as large as the five largest in this state combined in one, was proposed to be constructed from Red Bluff on the Sacramento river, around the eastern margin of the Sacramento valley, crossing the Feather, Yuba, and Bear rivers, and the intervening creeks magnified into torrents, and also half a dozen or more other large canals and any number of medium sized and small ones. This was about the aspect of the Cavour canal project. The water-way was to give passage to 3,885 cubic feet of water per second, and diminishing in capacity at successive main points of distribution, it was to extend from the Po at Chivasa, at the head of the main valley, as it were, around the north side of the valley to the Ticino, one of the principal rivers entering the plain from the north.

When in 1854 the project had been quite thoroughly examined

[1] See, Moncrieff, Chap. XIV.

and estimated upon, it was the intention of the Sardinian government to carry it out as a public work, seeing that a large part of the country which it would command was already partly supplied by government canals, and yet the supply of water was short and a great demand existed for an additional amount. But the Crimean war crippled the resources of the government, so that when a company of English capitalists proposed to take the matter in hand, the government assented, and, hence, resulted the concession to the Company General of Italian Irrigation, in 1862, of which an abstract will be given in the next section of this chapter.

The principal object of the work was to supply water to the great canals already existing, particularly at the season of low stage of the rivers from which they drew their supply, at which season the Po had a surplus of water to spare. The originally estimated cost was $7,070,000. The contract for the canal was let for $8,875,000. Contingent expenses, damages, and other matters raised the total estimated cost to $10,660,000. The purchase of the crown canals—a part of the agreement, as will hereafter be seen—and expenses accruing before income was realized, brought the total sum to be paid out by the company up to $16,600,000. The nominal capital of the company was $16,000,000, but although the government guaranteed the interest at 6 per cent on that amount, from the time the work was opened, the stock of the company never went nearly to par, its actual resources never exceeded $12,200,000, so that it failed, and the works were thrown back on the hands of the government. Nevertheless, and although the project had so sad an outcome for the stockholders, the canal was built, and is a most noble work, and the original transaction between the government and the company affords an instructive example in policy of the government towards irrigation enterprise.

SECTION II.

Concessions to Capitalized Companies.

The Cavour Canal Concession.[1]

The history of irrigation in Italy does not afford many examples of concessions for purposes of irrigation in such form that they

[1] See, Moncrieff, Appendix C.

can be studied in details from the standpoint of the political economist. The general ideas of the policy of the Italian governments have been already outlined in this report, but there is no such stock of practical examples to be drawn from for illustration in detail, as we have found in France. Nevertheless, there have been some concessions of late date worthy of mention and analysis, but with the exception of that to the Company General of Italian Irrigation, for the construction of the Cavour canal, there is no data at hand in a form which enables me to make use of it in the necessarily hurried preparation of this report.

This Cavour canal concession was embodied in an agreement between the government ministers of finance and of agriculture, and six individuals standing for the company, and in a law bearing date of August 25, 1862, sanctioning this agreement.

I have made an analysis of these documents and grouped their principal points under headings as follows: (1) Obligations of the company; (2) Conditions of the concession; (3) Privileges to the company; (4) Benefits to the company; and in this form the matter is now presented.

An Analysis of the Concession for the "Company General of Italian Irrigation" to Construct the Cavour Canal—1862.

(1) Obligations of the Company.

The grantees became obligated as follows:

(1) To form a company for the construction and working of a canal by which should be diverted constantly from the river Po a quantity of water not less than 110 cubic metres (3,885.2 cubic feet) per second (supposing such a discharge to exist in the river).

(2) To combine the waters of said river with those of the Dora Baltea, for the irrigation of the Novarese, Lomellino, and Vercellese districts, in accordance with the law of third July, 1853.

(3) To comply with the project of the government engineers in every respect.

(4) To have the headquarters of the company at Turin.

(5) To organize within two months from the promulgation of the law approving of the agreement.

(6) To submit the regulations of the company to the government within a month from the promulgation of the law.

(7) To construct, entirely at its own expense, the said canals, with all the works belonging to, in connection with, or dependent

on them, for taking into and passing along the canals the constant discharge of water mentioned above.

(8) To commence the works within six months from the promulgation of the law.

(9) To complete the canals in every way, within four years from the commencement of the works, providing for every occurrence, and preparing for every event, ordinary or extraordinary, even of the greatest influence, without having power to exempt themselves from the liabilities assumed, and without having any claims to compensation or indemnity.

(10) To observe the contracts made by the government with the Association General of irrigation to the west of the Sesia, and those which were in force with other parties, and to satisfy the burdens, cares, responsibilities, liabilities, and obligations belonging to the said canals and property, the state considering itself relieved from every species of annoyance that may arise therefrom.

(11) To respect existing grants of motive power for the service of industrial establishments.

(12) To carry out, at the request of the government, the construction of catch-water and branch canals, even as far as beyond the right bank of the Po, near Casale, on the basis and guarantee, and with the advantages agreed on for the principal work.

(13) To obtain possession of canals, springs, water-courses, and portions of water, in the same manner and under the same terms.

(14) To raise a capital for the execution of the works, of eighty millions of *liras* ($16,000,000), of which fifty-three million four hundred thousand ($10,660,000) are reserved as a fixed capital for the construction of the new canal, inclusive of interest during the construction; twenty millions three hundred thousand ($4,060,000) shall be laid out on the payment of the price of the grant of the crown canals derived from the Dora Baltea and Sesia, and the remaining six millions three hundred thousand *liras* ($1,260,000) on the purchase of canals and volumes of water of private property, and on the formation of other canals.

(15) To submit for the approval of the government the projects of all the new works contemplated in the grant.

(16) To execute the supplementary works at its own expense, which the government deemed necessary to insure the constant supply of the main canal, and also to pay all expenses in connec-

tion with the government inspection, superintendence, and approval of the works.

(17) To be responsible for the preservation of the effects included in the grant, with all things pertaining thereto, in the manner and terms laid down in the list.

(18) To hand over to government all of the above mentioned effects at the end of the grant, in a proper and fair state of repair.

(19) To gauge the waters of the canal to be derived from the Po, and carried beyond the Sesia, above the head of the first outlet of said waters, by means of a hydrometer, made according to the best hydraulic rules, and referred to bench marks, in order to give a discharge of not less than ninety cubic metres (3,178 cubic feet) per second, except when there is a deficiency in the waters of the Po, in which case, the company shall make up the difference with the waters of the Dora Baltea.

(20) To lease out when called upon, to a general association of proprietors west of the Sesia, all the water which flows past the gauge above mentioned, at a price to be determined on by the government in concert with the society.

(21) To supply with the waters which are not thus leased out, the parishes, small associations and proprietors, at a price fixed by government.

(22) To retain in its service on the crown canals, of which it shall be given the use, at whatever salary the government shall establish, those officials employed on the direction and care of the said canals, who shall be specified in a list, and also to pay the annual salary of those on the reserve or retirement list, in terms of the laws in force in such matters.

(23) To deliver the volume of water necessary for the irrigation of that piece of land in the Lombardian territory lying above the Grand canal of Milan, to its left, provided the government sees fit to prolong the canal beyond the Ticino.

(24) To pay to the widow and descendants of the late surveyor, Francesco Rossi, who first pointed out the possibility of utilizing the waters of the river Po, for the Vercellese and Lomellino territories, the reward that was promised to him while alive, namely, the sum of 50,000 *liras* ($10,000), in the manner and terms which shall be fixed by government.

(25) To deposit in the state treasury as a guarantee, within fifteen days from the day of the publication of the law ratifying

the grant, a million of *liras* ($200,000) in paper of the Italian national debt, at the par value; this deposit to remain until there shall have been executed works for the construction of the canal, to a value of ten millions of *liras* ($2,000,000).

(26) To observe all the conditions and securities necessary to develop and harmonize the essential terms of the grant, and to guarantee as far as possible the reciprocal interests of the state and the company.

(*2*) *Conditions of the Concession.*

(1) That if the company used the royal canals which the government granted them, it must pay for the same canals and property 20,300,000 *liras* ($4,060,000), to be paid to the treasury in three equal portions, within twelve months of the promulgation of the law, by means of bills on banks approved of by government, payable at six, nine, and twelve months, which might be discounted on the exchange of London.

The payment of the said bills should be made to the treasury immediately upon the promulgation of the law.

(2) That at the end of the said fifty years, the whole property and free disposal of the canal should fall into the possession of the state, without any sort of compensation being due to the company.

(3) That the additional works carried out by the company at the request of the government, and the contracts for purchase, be approved of by law.

(4) That the expenditure on the formation of new canals, besides the main one, should be fixed by general consent, or by means of arbitration, and that the cost of purchasing them should be according to what is agreed on with the sellers.

(5) That the company accept as definite the sum of 53,400,000 *liras* ($10,660,000), as an estimated cost, and assume in consequence, entirely at its own risk and peril, whatever expenses there may occur in excess on the construction of the works necessary to insure the constant supply and the constant passage of the volume of water stated in § (1) p. 340, excepting the provisions with regard to the cost of maintenance and repairs.

(6) That the coupons of the bonds issued by the company should be countersigned by a government commissioner. The sum raised by the bonds should be deposited in the public treasury, to be issued to the company according to the actual requirements of the undertaking.

(7) That the company provide in due time the necessary sum on which the government guarantees the interest, and that it pay to the said treasury a commission of 2 per 1,000.

(8) That the bank in London through which the government pays the interest should give notice, fifteen days before they fall due, of the coupons or bills which may have been presented for payment.

(9) That the government have the right of supervising the execution of the works, and of approving them before they are carried out.

(10) That the government have the right, within four years from the commencement of the work, of prescribing all the supplementary works which may be necessary to insure the constant supply of the main canal.

(11) That the government have the right of watching over the proper execution of whatever forms a part of the present concession; as, also, of inspecting the management of the company in its financial affairs.

(12) That stock should be taken by the government commissioners, in contradistinction to the company, of all the effects included in this grant, immediately after the company should have undertaken the execution of it, in order to establish an efficient control over them.

(13) That the amount of water-rates and the price of water-power, except where otherwise specified by government, should be fixed by agreement between the company and the government, and that these must not be varied without consent of the government.

(14) That the final alienation of the water which the company was to have the right to carry across the Sesia must be approved of by law; and that in this case the profits of the sale should be deducted from the capital of the company, and the state should pay it the interest agreed on for the rest of the capital.

(15) That the obligation of the government guarantee be only conditional, and should only take effect when the net income should not amount altogether to the sum necessary to make good the guaranteed interest and refund. (The net income consists of the revenue of every description, including the rents and the returns of the canals and of the property handed over by the state, deducting all the charges for maintenance and repairs, both ordinary and extraordinary, besides those for administration.)

(16) That government reserved to itself the power of prolonging the new canal beyond the Ticino, to benefit that portion, hitherto unirrigated, of the Lombard territory lying above the grand canal of Milan to its left, giving the preference of the grant of it to the present company on equal conditions.

(17) That in questions arising between the company and the government, on the meaning and execution of the present contract, the decision should be referred to three arbitrators—the one chosen by the company, the other by the government, and a third by the president of the court of appeal sitting in Turin. The decision, provided it do not exceed the limits agreed to by the contending parties, should be final and obligatory.

(18) That after twenty years of the occupation have transpired, it should be in the power of the state to redeem the grant, paying to the company the capital corresponding to the mean net annual income of the last three years, at the rate of five per cent, with a deduction of the sum already refunded by the guarantee paid by government.

(19) That the general approval of the plans were to be given by government, within the year of the commencement of the canal.

(20) That the agreement be strictly limited to the expenditure of bare capital of 80,000,000 of *liras*, and that it have its full effect only when the sum in excess of the two capitals of 53,400,000 *liras*, and 20,300,000 *liras*, is being advantageously laid out on the works, and on the purchase of those works mentioned before, as being supplementary to the canal.

(3) Privileges to the Company.

On the foregoing conditions, the company should have privileges:

(1) To introduce from abroad all materials necessary for the construction and maintenance of the canal, with a reduction of 50 per cent on the customs duties, and to introduce free of customs duties those instruments and implements of work which the company might need to carry out the various operations of the canal, under compliance with the conditions, which, for the security of financial interest, might be established by the minister.

(2) To be exempt from all registration duties on deeds and contracts, arising from an execution of the grant, and subject only to the fixed duty of one *lira*.

(3) To use the royal canals derived from the Dora Baltea, with the branches of the same, and everything connected with, or depending on them, including the factories, mills, thrashing mills, and every other workshop there belonging to the state.

(4) To enjoy the use of the said state canals from January 1st, 1883, up to the end of the grant, and after that date, the state should resume full and free disposal of the same.

(5) To enjoy the use of the new canal to be constructed for fifty consecutive irrigating years, beginning from the year in which the newly constructed canal should commence working, if opened before the middle of April.

(6) To raise the capital required for the execution of the grant, partly by means of shares for the fixed sum of 25,000,000 *liras*, and partly by bonds bearing interest at six per cent, to the amount of 55,000,000 *liras*.

(7) To take the place of the state in carrying out the objects of the grant, and to insist on the observance of all rules in force.

(8) To alienate, with the consent of the government, all or part of the waters carried beyond the Sesia.

(9) To recover all rents of every kind due the company, in the same way, and with the same privileges as the law directs for the public taxes, by the appointed collector.

(4) Benefits to the Company.

(1) All works in connection with the canal were declared of public utility.

(2) The profits of the new canals, besides the main one, should belong exclusively to the company for the whole period of the concession.

(3) On the cost of construction of the canal, and on the sum raised according to agreement, government guaranteed to the company:

(*a*) An annual interest of 6 per cent, to be paid only for the objects of the grant, from the day in which the fifty years began to be counted.

(*b*) A refund of .3444 *lira* per cent on the sum expended on the canals to be derived from the Po, and on the royal canals derived from the Dora Baltea and Sesia, and on the other items of the balance of the capital a refund, in proportion to the number of years not yet elapsed, of the grant.

(4) Government engaged to prohibit the opening of new *fontanili* (springs) along the projected canals for a distance of 300 metres from the main canal, 200 metres on the principal supply canals, and of 100 metres on the main branches taken off the said canals by the concessionary company.

(5) Government engaged to provide that the communes, provinces, and responsible bodies be authorized to take that number of shares and bonds of the company that they might see fit, contracting loans to meet the payment of said shares and bonds, and mortgaging their income for three years ahead for the payment of the interests, and for the repayment of the capital, if it should necessarily exceed the natural limits of their special taxes.

SECTION III.

Governmental Policy and Encouragement.

General Policy as to Public Works.[1]

The Italian government, although of late years advancing rapidly in the scale of enterprise, and upon a line of policy looking directly to the development of the agricultural resources of its territory, has not to this time gone so far as has that of France in the way of encouraging irrigation enterprise. Italy owns more great works of irrigation than does France. But the present government has fallen heir to them from the governments and other constructors of long ago. Where irrigation is most demanded in Italy works were already constructed when the present government came into power a few years ago.

Other great interests were demanding attention, so that the improvement of rivers and construction of drainage works has been more in the line of governmental effort of late years than has the extension of irrigation facilities.

Encouraging Irrigation Enterprise.

A most important item of encouragement to irrigation enterprises was embodied in the law of 1873, concerning the organization of irrigation associations, an abstract of whose principal

[1] Letters from Hon. George P. Marsh.

points has been presented in the last section of the chapter preceding the present. Therein we find amongst other items of encouragement, an exemption from taxes for thirty years, on the increase in value of lands consequent upon the construction of new irrigation works. Again, in the supplementary law, of 1883, concerning irrigation associations, also noticed at close of last chapter, we find the financial bureau of the administration authorized to make loans to irrigation associations, and other items showing substantial government favors to irrigation enterprise.

Prize Competition in Irrigation Practice.[1]

Another step made recently is worthy of special mention. It will be remembered from a reading of a former chapter,[2] that, in 1874, the French government, by decree, offered prizes for the best examples of irrigation practice, as an encouragement for the economical use of waters, and a means of acquiring information about irrigation, to spread abroad among its agriculturists.

The Italian government followed closely in this line of policy, and by a decree issued in 1879, offered prizes not only for the best examples of irrigation practice, but also for the best examples of agricultural drainage, of *colmatage*,[3] and of drainage and irrigation combined. The following is the full text of the decree:

Royal Decree, which opens a prize competition for works of Drainage, of Irrigation, and of Drainage and Irrigation, combined. June 19, 1879.

HUMBERT I,

By the grace of GOD and the good will of the NATION,

KING OF ITALY.

In accordance with the resolution of the council of agriculture, at its session of 1879, which provides for the arranging of a prize competition for works of drainage, of irrigation, and of colmatage;

Conforming to the proposal of our minister of agriculture,

We have decreed, and do decree:

Article 1. There is opened a competition, with the following prizes:

Two of 4,000 *lire* ($800) and a gold medal; two of 3,000 *lire*, one with a silver medal; and three of 2,500 *lire* and bronze medals, or a work of art of equal value, in favor of a private individual, or an association that executes in the interest of agriculture, and with good results, creditable works of:

[1] Documents from Hon. George P. Marsh.

[2] See, pp. 144–148, *ante*.

[3] *Colmatage;* see, foot-note, p. 91, *ante*.

(a) Drainage.

(b) Irrigation.

(c) Drainage and irrigation combined, using for irrigation the drainage water collected.

(d) Colmatage, alternating with cultivation.

Article 2. Drainage, sub-letter *(a)* of the preceding article, must embrace an area of marshy land not less than fifteen *ettari*.

Irrigation, sub-letter *(b)*, an area not less than twenty *ettari*.

Drainage and irrigation combined, sub-letter *(c)*, an area not less than thirty *ettari*.

Colmatage, sub-letter *(d)*, an area not less than ten *ettari*.

Article 3. Drainage may be accomplished with open ditches or any system of drain-pipes, but must be so complete as to make the land well cultivable for winter wheat.

Article 4. Irrigation must be done according to rule, abundant distributing ditches must be provided, so that water may percolate without too great resistance.

Article 5. Water derived from drainage works may be conducted for irrigation, to lands at a considerable distance, but it must be done in a regular canal which will not obstruct its flow.

Article 6. Crops irrigated may be diversified to suit the character of the lands.

Article 7. The explanations of the works entering into competition must be transmitted to the minister of agriculture, industry, and commerce no later than March 30, 1880. The work must not have been commenced before the present date, and it must be competitive work, excepting colmatage in progress, of which the following article (8) treats.

Article 8. The work, sub-letters *(a)*, *(b)*, or *(c)*, must be completed no later than March 31, 1882.

Those, sub-letter *(d)*, are divided into two classes:

(1) Colmatage in progress, by means of which (the colmatage itself having been executed with good result) for two years at least, preceding the time specified in article 7, a crop has been raised each season after the drying.

(2) Colmatage not commenced at the time of the publication of the competition, but regularly carried on with satisfactory result to the date specified in the preceding paragraph of this article.

Article 9. The minister of agriculture, having received the statements of the work to be entered in competition, will have the condition of the land examined.

Article 10. The work finished in accordance with article 8, the minister himself shall order another examination to ascertain whether the competitor has satisfied the conditions of the competition.

Article 11. The results of the competition shall be presented in proper form to the council of agriculture, which has power to award the prizes.

Article 12. I order, that this decree, provided with the seal of

state, be inserted in the official collection of laws and ordinances of the kingdom of Italy, and command that every one interested observe it and cause it to be observed.

Dated at Rome, June 19, 1879.

HUMBERT.

This action is one in the interest of the individual cultivators, and shows the Italian government to be alive to the importance of the agricultural development of the country, and to realize the part which irrigation, drainage, and colmatage must play in such work. The object is, of course, in so far as irrigation is concerned, to incite irrigators to thoroughness and system in the preparation of their lands, and to care and economy in the use of waters, that it may become known what can be effected by such means, and thus not only new irrigations be encouraged but old ones remodeled and the better managed. This line of policy was reaffirmed on a broader basis in the law of 1883, of which an abstract has been presented in the last chapter.

Hydrographic and Agricultural Surveys of Italy.

Finally, the Italian government has in progress probably the most thorough study of its water-courses and water supply system that has ever been attempted for any country. Supplementing this work comes the inquiry concerning the use of waters in irrigation, now being carried on under the law of December, 1883, an abstract of which has been presented at the close of the preceding chapter.

Circular to Prefects.—Under the terms of this law, in January, 1885, the minister of agriculture, industry, and commerce issued a circular to the prefects of departments, instructing them substantially as follows:

Up to this time there never has been made a systematic and complete examination and exhibit of the extent of lands irrigated by the several irrigation works, associations, etc., and an estimate of the possible future extension of irrigation in the kingdom. The necessity for such an exhibit has become absolute. There is a valuable outline map, but it has not been filled in with agricultural details. This data must be systematically collected at once, and each prefect is charged with inaugurating and directing the work in his province. It is suggested that a commission composed of the heads of the provincial engineering and agricultural bureaus

be formed to formulate a scheme for the work. All existing available data is to be collected and a schedule made of it, and an estimate is to be made of the cost of completing the work, which estimate is to be forwarded to the minister, who will then give definite instructions to insure uniformity of work and economy of management in all the provinces of the kingdom.

Thus the Italian government, after centuries of irrigation practice within its country, is still advancing with quick steps in the increase of irrigation facilities. So that it is in a position, which is continually being bettered, to deal with its waters and streams in a business-like way. Knowing what waters there are, what claims there are against them, what use is made of those diverted to satisfy such claims, and what can be effected, the government of Italy is in a position to advance its agricultural interests, with a full understanding of the outcome of every proposed move; and to prevent by exposure of error those movements which must result only in litigation and loss. It treats such questions as every prudent business man would those of his affairs.

AUTHORITIES FOR CHAPTER XV.

De Buffon.—[Work cited as authority for Chapter IX.] Vol. I, Chap. I, and elsewhere.

Smith.—[Work cited as authority for Chapter IX.] Vol. 1, pp. 100–102, 196–202.

Moncrieff.—[Work cited as authority for Chapter VII.] Chap. XIV.

Marsh.—Letters and documents received from Hon. George P. Marsh.

Laws and Regulations.—Collection of laws and regulations received from Hon. minister of public works of Italy, 1885, elsewhere acknowledged.

IRRIGATION LEGISLATION AND ADMINISTRATION.

SPAIN.

SPANISH IRRIGATION LEGISLATION.

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Chapter XVI.—Old General Water Laws—Origin of Laws and Customs, Ownership and Control of Waters and Water-Courses.

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Chapter XIX.—New General Laws of Waters—Right of Property in Waters and Water-Courses, and Right to Use Waters.

Chapter XX.—New General Laws—Right of Way to Conduct Waters—Right to Abut a Dam—Expropriation for Public Utility.

Chapter XXI.—New General Laws—Irrigation Administration and Police, Organization and Communities.

Chapter XXII.—Irrigation Enterprise and Governmental Policy.

Spanish Irrigation Legislation.

INTRODUCTION.

More than in France or Italy, or any other part of Europe, in fact, in Spain artificial irrigation is an absolute necessity to a successful diversified agriculture; indeed, in extended regions of that country it is almost indispensable to success in any kind of valued cultivation. The Iberian peninsula lies but little removed from the highly heated and almost rainless countries of northern Africa, and, partaking in a marked degree of those peculiarities of climate which render them in great part desert, it resembles them also in being a country almost without forests, and, but for irrigation, would in some important quarters follow them but a few degrees less extremely in unproductiveness, also.

"It was said long ago, and with justice, that Africa begins at the Pyrenees;" and in truth the landscapes, climates, and productions of large parts of the great central plateau, and also of the extended region along the east and south coasts of Spain, are decidedly more African than European. Climatically, at least, it may be maintained that Europe ends with France, and that when the bordering Pyrenees are surmounted and central and eastern Spain entered, an African climate is encountered. As irrigation has developed in these regions under physical conditions more nearly like ours of southern California than are those of any other country whose laws bear examination for our purposes, it is well that we have some definite idea of the resemblances.

Central Spain, a region somewhat less than 300 miles square, is composed of a series of great plateaus, separated from each other and bounded north, east, south, and partly on the west by ranges of mountains. These plateaus lie at elevations between 500 and

3,500 feet above the sea, and slope generally from east to west. The mountains on the east present no continuous formation as a chain, and rise to but moderate heights above the hills bordering the plateau plains, but their eastern slopes are abrupt, and dropping to near the level of the sea, leave a narrow fringe of plain land between their feet and the Mediterranean, behind which they stand as a high, rugged range. North of the plateau region, and lying between it and the feet of the Pyrenees, is the valley of the Ebro river, near two hundred miles in length and fifty to an hundred in width, opening out upon the Mediterranean towards the east. South of the plateau region lies the valleys of the Guadalquivir and of its branch, the Genil, sloping in the opposite direction from that of the Ebro, and opening out on the southwest coast of the country. While south of these valleys last named lie the Sierra Nevada mountains, between whose southern slopes and the Mediterranean is a narrow border of sloping plain lands, only somewhat less wide and less continuous and connected than the seacoast plain of the eastern face of the country.

Aside from the aspect of the country itself as graphically described by authoritative writers of note, a glance at a good rainfall chart of Europe and the Mediterranean region, serves best to impress one with an understanding of the province of irrigation in central, eastern, and southern Spain. By such examination we find that the great central plateaus receive, as a general thing, less than 10 inches of rainfall per year, of which total less than 10 per cent falls during the summer months. The low plains of the eastern coast region receive from 10 to 20 inches per year, of which about 5 per cent falls in the summer. The south coast and the valley of the Genil receive 20 to 30 inches of rainfall, but only about 5 per cent falls in summer; while the valley of the Ebro receives about 15 to 20 inches, with only 10 per cent presented in summer.

Compare for a moment these figures with some for France, from the same chart. The driest regions of that country have from 10

to 25 inches per year, with 10 to 20 per cent presented in summer. In northern Italy the valley of the Po receives a total annual rainfall of 20 to 35 inches, of which 25 to 28 per cent falls in summer. It is evident that these two countries, which, as we have seen, are the localities of such great irrigation development, are far less in need of irrigation than is Spain.

In truth, the less elevated parts of central Spain present a climate quite similar to that of interior California, while eastern Spain has the characteristics of the Los Angeles coast valley of our State; and the fact is, that the productions are almost identical in the couplets above named. In central Spain wheat is grown by irrigation, alfalfa is a standard grazing crop, also irrigated, while grapes and temperate zone fruits are irrigated or not irrigated, according to the peculiarities of special localities, or to the purpose for which they are being cultivated. This is the case in our central Californian valley. On the low plains and in the valleys opening out upon the plains on the east coast of Spain, citrus fruits abound, olives flourish, the grape is cultivated principally for raisins, and the presence of the date palm and other semi-tropical fruits, marks the similarity to our plains and valleys of Los Angeles and San Bernardino.

Central Spain is the scene of many irrigation works carried out in a small way several centuries ago, and at intervals of time since then, of a few large works dating about a century back, of still another small number of large works dating within the present generation, and of a considerable number of moderately large works recently commenced or projected. The valley of the Ebro is the scene of some modern works and of present progress in irrigation; and the valley of the Guadalquivir is a scene of ancient as well as very recent irrigation enterprise. But the irrigated Spain of which the world has heard the most is that handed down from the times of the Moors in the valley of the Genil in Granada, and of the valleys and plains opening out on the east coast of the country, where lie the garden lands of Murviedro, Valencia, Al-

mansa, Alicante, Elche, Orihuela, Murcia, and other irrigated and highly cultivated districts.

Unlike the case in the great irrigated valley of northern Italy, already described, the irrigation districts of Spain are very much scattered, and subjected to physical conditions varying amongst themselves; and in a degree much more than in Italy or France, irrigation has grown up in Spain under social and political conditions much altered from time to time and differing in some quarters of the country from those in other quarters. Because of these reasons we find less unity in the several irrigation interests, and a less degree of uniformity in the customs and laws which have been developed in quarters; and, hence, the treatment which I have been able to give my subject in the chapters which now follow is less orderly and systematic than that which was possible for the irrigation legislation of France and Italy.

CHAPTER XVI.—SPAIN.[1]

OLD GENERAL WATER LAWS.

SECTION I.—*Origin of Laws, Customs, and Conflicting Systems.*
Ancient Spanish Laws.
Growth of varied Irrigation Customs.

SECTION II.—*Right of Property in Water-Courses and Waters.*
Roman, Gothic, and Saracen Systems.
Public and Communal Properties.

SECTION III.—*Control and Regulation of Waters and Water-Courses.*
Rivers and River Waters.
Small Streams and Riparian Rights.
Springs and Spring Waters.
Rain and Torrent Waters.

SECTION I.

ORIGIN OF LAWS, CUSTOMS, AND CONFLICTING SYSTEMS.

Ancient Spanish Laws.[1]

Primitive Spain was conquered and held by the Carthagenians, of whose laws and customs but little is known. To these succeeded the Romans, who, on the conquest of the peninsula provinces, introduced in them their language, customs, and legislation, and of which we are quite fully informed. During the decadence of the Roman Empire of the west, Spain passed under the dominion of various barbarian nations from the north of Europe, of whom, after a long period of dispute for supremacy, the Goths succeeded in overcoming all others and remained masters of the country (A. D. 412). These Goths, at first permitting the Spaniards to retain the Roman laws and customs, which it appears were popular and then in use, afterwards gradually introduced others of

[1] See, Compendium of the History of the Royal Law of Spain, from the Institutes of Alvarez, translated in White, Vol. I, p. 352, *et seq.* See, also, White, Introduction; Rockwell, Preface; and, Wallis, Chap. VIII.

their own, that harmonized with or supplanted those of the country. The first written Gothic laws bore date in the latter part of the fifth century; the first extended code is indefinitely ascribed to several parts of the seventh century, and is that published in Latin during the twelfth century by the title of *Liber Judicum*, and afterwards in Spanish as *Fuero de los Juices* or *Fuero Jusgo*. This Judges Statutes is composed of the edicts of the Gothic Kings and of the various councils of Toledo, partly founded on principles of Roman law,[1] with other enactments of unknown origin, and "is held as the fountain or origin of the laws of Spain."

The Gothic monarchy in Spain was overthrown (A. D. 714) by the Saracens from northern Africa and Arabia, who, in Spanish history, are commonly known as Moors, and who introduced their own customs and legal polity. But all of Spain was not held by these people, so that in the provinces thus free the Gothic laws continued in force for many years. Then came a period when Spain was being gradually reconquered from the Moors by two or three independent Spanish principalities; during which new customs and laws became established in different quarters of the peninsula; and out of these came compilations or codes put forth from time to time by the several rulers. Amongst these the *Fuero Viejo de Castilla* (Old Statutes of Castile) was promulgated at the end of the tenth or beginning of the eleventh century, which after and with the *Fuero Jusgo* constituted the fundamental laws of Castile as separate from Leon. This code was successively added to at various times until the middle of the fourteenth century, when it was amended and arranged in the form in which it is now found under the names of *Fuero de Castilla* (Statutes of Castile), *Fuero de los Hijosdalgos* (Statutes of Gentlemen), and *Fuero de los Fasañas* (Statutes of Sentences).

In the Kingdom of Leon there was, after several minor codes, promulgated (tenth century) the *Fuero Real* (Royal Statutes); but the old *Fuero Jusgo* of the Goths continued in force in all relating to common law. After a long period of local wars and conquests, another code of the same name, *Fuero Real*, was promulgated for the Kingdom of Castile and Leon, in the middle of the fifteenth century, but this was partly overthrown by the opposition of the nobles and people, and the old *Fuero Jusgo* was again put in force. Following these came the *Leyes de Estilo* (Laws of

[1] Rockwell, p. 9.

the Age) which reconciled differences and explained the *Fuero Real* so that it remained in force. During the last part of the thirteenth century the famous code called the *Partidas* was compiled, but it was not put in force until the middle of the fourteenth century, because of the wars and disturbances, and for other important reasons which intervened.

"The *Partidas* was composed in a great measure of the laws of Roman codes, of chapters from the canonical law, and authorities of the holy fathers. It is evident that they likewise contain many ancient laws of the kingdom, and that the customs and statutes of the nation were consulted, the desire being to issue a perfect legal code, and peculiar to our Spain. But this important object was not attained completely."—[Alvarez: trans. White.

Following the *Partidas*, in the middle of the fourteenth century, came the *Ordenamiento de Leyes* (Ordinance of Laws), whose statutes afterwards passed into the final compilation hereafter to be spoken of. In 1567 was promulgated the *Nueva Recopilacion*, the first code of laws intended for all Spain as governed by the modern Spaniards. This compilation has been remodeled and added to from time to time, until in 1805 it was again revised, promulgated, and ordered to be observed under the title of *Novisima Recopilacion de las Leyes de España.* This newest compilation of the old laws, composed of twelve books, is recognized as the embodiment of former laws operative at its date, and forms the basis and body of the Spanish law to this time.

"There is perhaps no country in the world where enlightened commentaries on the various codes were more needed than in Spain. After the Saracen invasion from the ninth to the fourteenth century, there were no regular systems of government and jurisprudence. The Roman Civil Law, which was the basis of all the modern codes of continental Europe, was not much regarded until the famous compilation of the *Partidas* was digested and arranged, founded principally on its maxims. The Visigoths prohibited, under certain penalties, the use of the Roman laws, as will be seen by the *Fuero Jusgo*, repeated in the *Fuero Real.*" * * * * "At one time such was the confusion in the codes of Castile, and the difficulties in their administration, that they were entirely abandoned, and the Roman law resorted to as the rule of decision."—[White, Introduction, p. x.

As illustrating the importance of the newest general compilation and the confusion in the Spanish laws, even after its promulgation and at least up to the time of the first part of the last reign,

and just prior to the commencement of that revival in system and order which will be traced in a future chapter, the following paragraph from a very instructive and readable work, is in point:

"Since the promulgation of the *Novisima Recopilacion*, there has been no collection of the laws printed which approximates or pretends to completeness. The decrees of Ferdinand the Seventh and of the different Cortes are, it is true, readily accessible in print but many radical changes have been wrought, by special orders, resolutions, and interpretations, which lie buried for the most part so deeply in the executive archives that, for all purposes of general information, they had as well been affixed to the top of the old tyrant's column. Indeed, the whole system of administration has undergone so many shocks and revolutions during the present century that it is not always easy to determine the precise location even of the archives themselves, through which the course of any particular legislation is to be traced. So many councils have been modified, abolished, and recreated with new functions, and the duties of all and each have been so often altered and transferred that, even after ascertaining the date and origin of a decree or order, it is next to impossible, often, to discover in what vortex of the documentary chaos the authoritative original may be revolving." —[Wallis, p. 69.

But, in a measure taking the place of official compilations of the laws and administrative acts generally, there were the writings of several authors whose works came to be regarded as authoritative. Among these was Escriche, whose Dictionary of Jurisprudence has formed the basis for the last section of this chapter.

We will see in later chapters, under the heading "New Spanish Water Laws," that, in so far as water-right and irrigation legislation is concerned, at least, a very clear and complete system has since been evolved.

Growth of Varied Irrigation Customs.

The foregoing brief and partial outline of early Spanish history and the growth of laws in two of the petty kingdoms of the peninsula, prepares us in a measure for an appreciation of the many conflicting elements that have had to be reorganized or reconciled in the formation of the more modern codes of the country. Even the newest compilation of 1805, in the matter of waters and watercourses recognized local laws and customs, and in great measure made general rules subservient to them where well established and in written form. These local customs, many of which received

royal sanction at some time, were even more varied than the more general written laws, but they were, locally, all powerful.

"Custom is unwritten law that has been introduced by use. In order to be such, and not vicious, it is required that the usage be that of the people, or of the greater part of them, for the space of ten years, and that it be in harmony with the general utility. Two uniform judgments or sentences are one of the proofs of custom. A legitimate custom has the force of law; derogates the former law that is contrary to it, and interprets the doubtful law; from whence it is said that there is a custom beyond the law, contrary to the law, and according to the law."—[Manuel del Abogado, Vol. I, p. 3.—White, Vol. I, p. 360.

It is believed that most of the irrigation customs were of Moorish origin, notwithstanding the fact that in the reconsolidation of the country and remodeling of its laws, everything of a general nature which pertained to government under the hated infidels was abolished; for individuals of this race, who renounced their faith and adopted that of christian Spain, were permitted to retain their property and their customs; and, taking advantage of this privilege, many thousands of people of Moorish blood, but generally those who were descendants of Moors amalgamated with some of the peoples of Spain, but who had grown up and lived in the Moorish provinces as Moors, remained, forming chiefly the population of the parts of Spain overlooking and bordering the Mediterranean. Now, these provinces contained *the* irrigation regions of the country, as at that time developed. There had been irrigation practice in Spain long before the advent of the Moors, which had probably been introduced by the Romans; but there is no evidence upon which to ground a belief that the practice had been at all general, or other than on a small scale and dependent, as was most of the irrigation of Roman origin, on works constructed primarily for the supply of the domestic and sanitary necessities of people living in towns. At any rate, if there had been any large works, or extended practice, or peculiar customary laws, the result and outgrowth of Roman irrigation enterprise in Spain, the evidence of these had been pretty much effaced from the country and the habits of the people, by the effect of wars and the incoming of other peoples. The Moors, no doubt, also found irrigation practiced to some extent in Spain as the result of a recent transplanting of custom by the way of southern European countries, or, possibly, as a direct importation by maritime people, from the countries east

and south of the Mediterranean; but they brought it anew by the way of Africa from the same nurseries of the art, and by their intelligence and industry made some portions of Spain celebrated for their fertility and the beauty of the local landscapes. On the expulsion of the Moors, as I have said, the provinces retaining part of the Moorish or mixed blood populations, were permitted to cultivate their fields and to operate their canals with the waters allotted to them by the Moorish governments, and their customs were not set aside by the general laws of the country. Thus the foundation was laid for the present local customary laws in the irrigation regions. The people clung to their peculiar privileges. Old claims were validated by special royal grants, and some new ones created upon the same basis during the early periods of Spanish rule over these irrigation regions of the Moors, but Spain, generally, made no great progress as an irrigation country after the expulsion of the Moors, for several centuries, and until the early part of the present century.

Meanwhile, as has been said, the laws of the country had been several times codified, from Gothic and Roman originals, and from the acts of the rulers of that part of Spain not developed as an irrigation country. Thus, irrigation found no prominent place in these general laws, but was regarded rather as a local custom of certain provinces cut off from the rest of Spain by the topographical configuration of the country, and from the rest of the Spanish people by the difference of race and even of language; so that its governance was largely left to local custom. But, gradually, the art grew in other parts of Spain. The attention of the rulers was brought to it only as it very slowly developed by small local and individual enterprise. Other local customs grew. Confusion resulted. And Spain has had for a century or more as difficult a problem to solve in the formation of a general law of waters that would be acceptable to the people of all the provinces, as California can possibly have to put forth an irrigation code that will meet the requirements and ideas of her various irrigating and non-irrigating communities.

Studying this ancient branch of the irrigation system of Spain, we find, then, two distinct lines to follow. *First*—The old general laws of the country, principally as governing rights of property in and the right to use water in irrigation; and, *Second*—The local customs affecting the subject, and which are notable because they

present certain important details and illustrate the development of certain unique principles of administration that have since found place in the new laws.

SECTION II.

Right of Property in Waters and Water-Courses.

Roman, Gothic, and Moorish Systems.[1]

The legal history of property holdings in Spain begins with the establishment there of the Roman law, of which in its relation to water-courses and waters we have a review in the first chapter of the present report. Then came the Goths whose laws were founded in the despotic system; but these people in Spain made no such radical changes as were made by dominion of similar barbarian people elsewhere. Their laws pure and simple were never established in Spain, but, modified by the injection of principles of the civil law, gave precedence to such systems as that embodied in the *Fuero Jusgo.* Amongst the chief innovations on their laws made by these Goths, was that relating to land holdings: their system of land tenure was not adhered to—the waters were regarded as common and the rivers as public property—and not until their overthrow by the Moors in the early part of the eighth century, were the streams, rivers, and water regarded as the property of the ruling powers.

But the Moors themselves became in Spain a wise people. Their rulers were far-seeing and liberal to their subjects. The value of water when wedded to land was fully recognized. The agricultural prosperity of the people was not undervalued; so that perpetual rights to water for irrigation purposes were accorded to those who were in position best to utilize it, and many extended rights of this class became thus established, to be long afterwards recognized by the reconquering christian rulers, by way of courting the good will of the people who submitted to them. Thus during those centuries while in Italy and France the waters were owned principally by despots, in Spain, by a singular fatality, the first great barbarian people who, after the Romans, held the country for a very long period, virtually adopted the liberal Roman law of

[1] See, White, Introduction; Rockwell, Preface; Aymard, generally; Hallam, chapters "Feudal System," and "Spain."

waters; and the next invaders, of another class of despots from another and widely different quarter, so far changed their barbaric attributes as to become most wise dispensers of water privileges, and encouragers of a liberal irrigation practice. Thus was irrigation specially blessed in the matter of freedom from oppression of rulers in Spain, until in the ninth century by a christian emperor in a part of the country free from Moorish rule, the feudal system was introduced.[1] But although this system obtained firm footing in northern, western, and central Spain, it was stamped out before the eastern and southern part of the country, embracing the great irrigation regions of that time, was wrested from the hands of the Moors. Old irrigated Spain, therefore, never was subjected to feudal rulers; and, as a consequence, we find there no great water holdings, like in Italy, oppressing the people and resulting in monopoly of lands, but, on the contrary, we find the waters attached to the lands, the lands held in small parcels, and the people an independent peasantry.

The Divisions of Property[2]*—Pueblo and Communal Properties.*[3]

The laws of the *Partidas* as given in the *Institutes* and also embodied in the *Recapilacion*, show "the division of things with respect to propertyship" to have been the same with the early Spaniards as with the Romans before them: running waters were a common property of all men; and rivers, a public property of the nation. A marked difference, however, is shown in the importance accorded to things the property of a corporation or a community, which in the Spanish is in excess of the Roman home-rule system. This is accounted for by the greater importance of the local commune or *pueblo* in Spain.

Under the Spanish custom, towns are communities holding various kinds of property in trust for the people and for the benefit of the town. The use of some of these properties was farmed out for rents which constituted a large part of the municipal incomes. Other classes of the common property were free to the use of every citizen of the town, without rent, but such use was subject to regulation by the town councils, and to supervision by the *alcaldes*

[1] White, p. 85.

[2] See, Institutes of the Civil Law of Spain; White, Vol. I, Book II, Title "Of Things," pp. 70–84.

[3] Dalloz, Vols. IX and X, word "Commune;" Merlin, Vol. II, word "*Communaute d'habitants;*" Brooks; White, The Institutes, etc., Vol. I, pp. 70–84.

and their subordinates. Of this last class of property were the waters intended for irrigation. *Pueblos* were towns specially incorporated by governmental license, having all the powers and privileges of ordinary communities in the matter of holding properties, and others besides. Spain received the communal system of town organization, with the attendant prerogative of holding communal estates, from the Romans, who developed it with their system of colonizing new provinces.

"All Roman towns originally possessed certain common property, but the system of holding a domain or territorium took its origin in the Roman colonies, who, going into vacant countries where the land had no owners recognized by them, and where they were compelled to defend themselves in common from the people upon whose domain they intruded, voluntarily held the land in common, except their house lots which they occupied.

"When they invaded Spain and dispossessed the natives, they introduced the same system there. When the Goths came they made no change in the system; they divided the private lands between themselves and the Romans, leaving community property as it was."—[Brooks-Godfrey.

Common Property of Communities and Pueblos.

"These towns had nothing which can be considered in the light of a charter. They were not incorporated, yet they possessed all the rights and the powers of municipal corporations. They did not derive these powers from any charter, grant, or concession, but the rights and powers took their origin from the existence of the town itself, and not from any act of sovereign power."—[Dalloz, Vol. 9, p. 149.

"This patrimony of the communities of inhabitants, to employ the expression of our ancient jurisconsults, was independent of the municipal constitution which might govern them. The inhabitants formed a moral person capable of holding property, whether they formed a commune or not. It was something inherent to the very existence of the community."—[Merlin, word cited, parts 1 and 2.

The feudal system was antagonistic to this form of organization and property holding, and spreading throughout southern Europe generally swept away the communal properties of the towns, but in Spain, notwithstanding the many invasions to which she was subjected, and notwithstanding the supremacy of the Goths and the long occupation of the country by the Moors, the communal right survived. "The people being almost continually involved in war, it was in a measure impossible for land or water to be

divided into individual possessions to any great extent. The towns were the centers where protection was to be found from the armed bands of marauders who infested Spain in one form or another from an early date. The towns were required to guard the country about them in common, and it was therefore natural, that the land itself, and incidentally any other rights either of water or otherwise appurtenant thereto, should be held by each town in common to make it the common interest to guard and protect it."—[Brooks.

The estates so held by each town were called its *termino*. This *termino* was known by various names, according to the class of property and use to which it was put. There were: (1) *Montes*, or woodlands whence firewood were obtained; (2) *Dehesas*, inclosures where cattle were herded; (3) *Fuentes*, springs of water for domestic purposes and for irrigation; (4) *Ejidos*, gathering grounds—open spaces around the gates and walls where the populace gathered, for recreation and sometimes for thrashing grain; (5) *Prados*, inclosed fields for pasturing cattle; (6) *Pastos*, open pasture lands; (7) *Aguas*, waters and water-courses for irrigation; (8) *Salinas*, salt springs; (9) *Abrevaduas*, places for watering cattle; (10) *Vadios*, waste lands, or lands not otherwise named or classified; and (11) *Propios*, town lots, stalls, houses, shops, market places, and squares.

Nature of Communal Property Holdings.[1]

It is well to be exact in our understanding of this holding of communal property. It was not the property of the inhabitants of a community, either severally or collectively: the proprietor was the community—the moral person formed by the collection of inhabitants, but distinct from the individuals. These did not exercise the rights of a proprietor upon the communal patrimony, for it was administered in accordance with special rules.

"From the time that men have united in a common inclosure, from the time that the city, or, to employ a more general expression, from the time that communities of inhabitants have existed, communal property has been born.

"Whatever besides may have been the political or municipal régime, it was necessary for those who lived near one another to unite themselves for common buildings, temples, places destined for exercises and public games.

"*Universitates sunt non singulorum veluti quæ en civitatibus sunt*

[1] Dallos, Vol. X, word "Commune," p. 117.

theatra stadia et similia, et si quæ alea sunt communia civitatum. (Instit., L. 2, Tit. 1, p. 6.)

"With the progress of civilization, the relations of citizens increased, and at the same time the resources of the cities. Their patrimony had to enlarge. Under the Roman legislation a great number of laws had for their object to increase the property and revenues of the towns. Trajan permitted them to receive heritages in trust. Soon they were authorized to receive them directly. Adrian accorded them the right to receive them in accordance with the laws. (Ulpian fragm., Lib. 24, Cap. 28.)

"The towns were often despoiled of their useful and productive patrimony. They were so despoiled by the emperors, and even later by the barbarians. The feudal régime established almost everywhere, left them hardly anything. But from the time that they became free, they worked to form a new patrimony. Their first properties were ramparts, a common hotel, and a belfry or tower inclosing the bell of the assembly and of the prison. They found resources in the assessment of their inhabitants, in the donations made by some rich citizens, liberalities which ought to be more abundant and more frequent in favor of a new institution. The fines pronounced by the tribunals were for their profit, and had to be applied to the maintenance of their fortifications. Sometimes the king abandoned confiscated goods in their favor, or authorized them to receive commissions on public auctions, on the sites for fares and markets, on the measuring and weighing of merchandise. (Histoire admin. des communes de France, par M. Ch. Dupin, p. 175.)

"The nature of communal domain carries with it, as we have already said, notable differences, according to the destination of the properties it treats of. Let us establish the differences which exist in this respect between the various common properties. We will distinguish at first the common properties into properties *patrimonial*, and *common* properly speaking. The *patrimonial* properties of a commune are those which it enjoys immediately for itself, or in receiving for the profit of the communal treasury the revenue which comes from it: such are the town hotels, occupied by the mayors, the houses, buildings, and manufactories which can belong to a community, and which would be let for its profit, the rural domains in cultivation, and which would be let for the same; the taxes and rents which would be due to it; the stock of furniture, library, etc., which should belong to it. *Common* properties are, on the contrary, those of which the community does not enjoy or does not receive immediately the revenue itself, but which are devoted to the common enjoyment of the inhabitants because it is their natural destination. Such are pasturages where beasts are sent, forests in which the inhabitants have the right to cut wood.

"There is a second distinction to be made between the things

which make a part of the private communal domain, and those which belong to the communal or public municipal domain. The latter comprises all the things which are not susceptible of private property, but which are used for a public service, as churches, streets, public places, fountains, etc. It must not be confounded with the public domain, properly speaking, which is composed of the great highways, navigable or raftable streams and rivers, ports, etc. (article 538, C. Civ.), for these portions of the territory are at the charge of the state, which directs the great public services.

"The things which form a part of the public municipal domain have the same character as those spoken of in article 538. But we give them this denomination because that, for the most part, they accrue from or are presumed to accrue from the communities, that they are more particularly useful to the inhabitants of the places in their neighborhood, and that on account of this utility they are placed by the law in charge of the community."—[Dalloz, Vol. X, Secs. 1799 and 1800.

Pueblo and Town Water-Rights.[1]

Thus, under the old Spanish law, waters were held by municipalities—pueblos or communes—as a common property for domestic use, irrigation, and other purposes, but while their utilization was free to all inhabitants of the town, it was governed by municipal rules, and regulated and controlled by the town officials. These waters were those of springs and other sources rising on the municipal lands, the waters of small streams, the right to whose use dated from immemorial time or had been acquired by prescription, and waters of rivers acquired by prescription or by grant from government.

There are several royal orders dated during the sixteenth, seventeenth, or eighteenth century, commanding the provincial authorities to encourage the towns in the use of waters. Now the town holdings or *terminos*, were frequently extended regions of country in the olden time, and "there was a great deal of municipal law regulating the use of water, and officers to take control of it." So that the general laws respecting water-courses were often overlooked and unknown, as compared to municipal regulations and customs on the subject.

Under these circumstances, where the use of water in one town holding interfered with that in another, the dealings were as between the communities and not between the individuals. In the eyes of the general law the community was regarded as the indi-

[1] See, authorities already cited for this section.

vidual in such cases. Thus, there were in Spain, rivers or streams whose waters were common property to all people of Spain, and other rivers or streams whose waters were common to the inhabitants of certain towns or pueblos. The general laws of waters were applied to the one, while local municipal laws or customs ruled in the other class. All cultivable lands of the towns belonged to the towns until apportioned out to their inhabitants. All running waters available for irrigation, within their *terminos*, belonged to the towns, notwithstanding apportionment. Hence, there was no conflict by reason of riparian claims, for under such circumstances there was no riparian right. As between different grantees of land from the government, or as between communities, this right was known, as will be seen in the next subdivision.

SECTION III.

Control and Regulation of Water-Courses and Waters.

Of Rivers and their Waters.[1]

As distinguished from a torrent, a river "runs perpetually and from time immemorial," while torrent waters flow "after abundant rains, or the extraordinary melting of snow, in such way that they only run a certain time, and leave their beds dry the greater part of the year."—[Escriche, *Rio.*] Rivers belong to everybody in commonalty, in such way that even those of a strange land can make use of them the same as the natives and inhabitants of the territory through which they flow.[2]—[Escriche, *Rio.*]

In the use of rivers, "individual good must yield to public utility." No one may put in the channel or on the bank of a river any structure which may impede navigation, and any such structure put in place must be removed at the cost of its owner within thirty days.[3]

When no injury may result to the community, any member thereof may erect a mill or a water-wheel on the bank or immediately upon the river, in such way that the course of the water is not affected by the construction. Should the land be of the public

[1] Escriche, words "*Agua*," "*Acequia*," and "*Rio*," and laws cited from the *Novisima Recopilacion.*
[2] *Nov. Rec.:* Law VI, Title XXVIII, Part III.
[3] *Nov. Rec.:* Law VIII, Title XXVIII, Part III.

domain, the permission of the government must be had; should it belong to the community, the permission of the council must be obtained. In erecting and using such mill or other structure, the use of other similar properties must not be interfered with in a way to diminish their efficiency and value.[1]—[Escriche, *Rio.*]

The waters of rivers, whether navigable or not navigable, which of themselves or by junction with others follow their course into the sea, are not and cannot be private property, but belong to the public.—[Escriche, *Agua*, III.]

Unless the town or council destines the waters for its own use, any person may take from a public river, by means of a ditch, the water which he may require. Should the land belong to the public domain, or should it belong to the community, the permission of the government, or of the council, as the case may be, must first be had; and prior rights of all others to the waters must first be assured.[2]—[Escriche, *Rio.*

From which it follows that no one could make a diversion without its being determined whether or not others were to be injured, and whether or not the town required the waters for its uses; and that such diversions could only be made to the extent which the person required for his own use.

No one may construct from a navigable river any ditch or canal that may embarrass navigation; and should there be one already made, either new or old, it must be stopped up or destroyed at the cost of the owner, for the reason that public utility must be preferred to the good of individuals.[3]—[Escriche, *Acequia*, and *Agua*, III.

In utilizing the waters of rivers not navigable, but which join and contribute to the volumes of those which are so, diversions must be made in "such a way that there may be no want of water for navigation."—[Escriche, *Rio.*

"But should the river not be navigable any resident of a town through which it passes may take out a portion of its waters, and construct a ditch for the irrigation of his lands, or to move his mill or water wheel, or for other purpose that may interest him, provided he does it without any injury to the common use, or the destination that the town may have given the waters, and under the understanding that if the ditch has to cross lands not his own, of the royal patrimony, or of the municipality, the permission of

[1] *Nov. Rec.:* Law XVIII, Title XXXII, Part III.
[2] *Nov. Rec.:* Law VIII, Title XXXII, Part III.
[3] *Nov. Rec.:* Law VIII, Title XXVIII, Part III.

the owner, of the king, or of the municipal council will be indispensable."[1]—[Escriche, *Acequia*.

The owners of lands bordering non-navigable rivers "may use their waters for the benefit of their estates or industries," but "without injury to the communal use, or to the use which the towns, on their transit may have put them," and "subject to the modifications laid down in the laws, orders, and decrees spoken of."—[Escriche, *Agua*, III.

In 1788 the local general administrative officers of Spain and of the Spanish possessions were instructed, by royal order, "to increase the productiveness of the country by the use of all the waters" that could be applied in irrigation to the benefit of the lands of their respective towns; and for this purpose to "endeavor to take out ditches from the rivers, tapping them at the most convenient points, and without interfering with their flow, or prejudice to the lower communal properties and districts;" taking care to discover, bring to the surface and utilize, also, the waters which flowed through the sands and gravel below the ground's surface.[2] —[Escriche, *Acequia*.

In 1819, "with the object of promoting agriculture," by royal decree, special inducements, privileges, and immunities were offered to "municipalities, communities, companies, ecclesiastical bodies, or private individuals, who, conformable to previous authorizations by the government, construct, at their own expense, ditches or canals for new irrigations." The waters for these irrigations might be taken "from rivers of great volume, or gathered together from many rivulets or small sources to one point, or drawn out from the bosom of the high mountains;" but in each case the project was to be first sanctioned and the utilization authorized by the government.[3]—[Escriche, *Acequia*.

Notwithstanding the special encouragement offered to utilize public waters in irrigation, and the instructions to local administrative authorities to so use them for the benefit of their town lands, and notwithstanding the general rules as to utilization of waters by communities and individuals, all diversions or utilizations were subject to prior claims of use: "No individual or corporation can divert from their source nor in their course, flowing waters or rivers that from ancient times have irrigated other lands lower down,

[1] *Nov. Rec.:* Law VIII, Title XXVIII, and Law XVIII, Title XXXII, Part III.
[2] *Nov. Rec.:* Law XXVII, Title VII.
[3] Royal Decrees, August 31, 1819.

the which cannot be deprived of the acquired benefit, in favor of others, who from the fact of not having utilized the waters before, consecrated the right of those who did."[1]—[Escriche, *Acequia*.

Of Small Streams and Riparian Rights.[2]

As already remarked, the regulation of the use of waters of small streams, such as were ordinarily used for irrigation in Spain under the old system, was left very much to municipal ordinances and ancient local custom, and of course these varied in different parts of Spain, but Escriche made a code governing rights on these streams, as applicable where no such ordinances or customs prevailed, which he says is "founded on equity and the interests of agriculture," and on the laws which he refers to. I present translated extracts, without comment except to call attention to the fact that on several important points the new law of waters has certainly not been framed on this author's writings as an authority.

The first extracts are applicable to "running waters which may not come under the head of those which nobody can utilize without license or authority:" in other words, to the waters of such small streams that neither the provincial nor the general government had seen fit to declare navigable or floatable, or establish regulations for, and which were not within the jurisdiction of a pueblo or community where local regulations had been made or enforced for the governance of the streams and use of their waters. The author referred to wrote as follows:

"The waters of fountain heads and springs are the property of the owners of the lands on which they rise or of the lower fields, who have acquired the right to their utilization, as long as they remain within their precinct, but as soon as they flow out of it, they become running waters, *aqua profluens*, and belong, like all common things, to the first who may occupy them, as far as he needs them.

"The first persons who can make use of them are the owners of the properties which they wash or cross.

"If running water passes between the properties of different owners, each one of the latter can use it for the irrigation of his property, or for any other object: not entirely, however, but only in the part that belongs to him, because all have equal rights, and consequently, they can prevent each other from taking more than their respective shares.

[1] Royal Order, April 5, 1839.
[2] Escriche, word "*Agua*," § IV.

"When the water passes within a property, the owner can use it arbitrarily, for, since the both banks are his, he has not to subject himself to the interests of another riparian owner; but at the outlet of his estate, he must return it to its natural or ordinary channel, without having power to absorb it, or entirely consume it, nor give it another direction, because it does not belong to him as a property, but only to the extent of the use which he can make of it in its passage.

"Since, then, every riparian proprietor can use the water which passes by the edge of his property to irrigate it, it is clear that he can open drains, irrigating canals and ditches, and even construct a dam or other structure to take and carry it to his property, provided he does not make it overflow the higher lands against the will of their owners, or inundate the lower lands in a way that may cause injuries, nor hold it in such a way that the neighbors are deprived of their accustomed irrigation.[1]

"None of the riparian proprietors can construct works on the property of another without his consent, nor even raise on it a weir or dam to cause the waters to enter more abundantly on his property; since all have the same rights, the works ought not to be made, except in such a way that the water will be divided with equality.

"But this principle of equality in the division of the waters is subordinate to the interest of agriculture, which will regularly demand that the greater quantity be devoted to the estates of greatest extent, as the Roman law required. Nevertheless, as the largest estate does not always need the greatest amount of water, the maxim of the Romans ought not to be applied except under certain restrictions.

"As the higher proprietors cannot absolutely deprive the lower ones of the use of the water, but must restore it to its natural channel after having made use of it, except the inevitable loss caused by the irrigation; in the same manner, in an inverse sense, the owners of mills, water-wheels, fulling mills, factories, and other industrial establishments, have no such right to all the water necessary for the movement of their machines that they can deprive totally of it the proprietors of the higher properties.

"Nevertheless, when it is a question of mills in a country where there are few, and, on account of a drought they need all the water, there ought to be suspended on their account, for the common good, the irrigation of the meadows and the other properties as long as the state of drought lasts.

"A riparian proprietor can transfer the right of taking the water by renunciation, cession, sale, or other means in favor of the proprietor on the other side, or of him lower down, and if, having two properties, he gets rid of one, he can reserve the exclusive right of using the water for that which he preserves, or conceding it for that which he transfers.

[1] *Nov. Rec.:* Law XIII, Title XXXII, Part III.

"A riparian proprietor can similarly acquire, with respect to another, the exclusive right to the water by means of prescription.

"The riparian proprietor cannot, without the consent of the other riparian owners interested, concede to a third party, to their injury, the power of taking water from the same stream or on to his estate, nor himself use the water to irrigate another property which belongs to him, but which is not situated on the bank; although this right can be acquired by prescription.

"When a property on a river bank is divided amongst several joint or common owners, in a manner that the portions which are assigned or sold to any of them, and which now form other small properties not bounding on the stream, they preserve, nevertheless, one with another, their right to the water in the same proportion that they had before the division, even when nothing should have been stipulated on this subject.

"The proprietor who augments the extension of his riparian property by the acquisition of lands contiguous, which increases it, cannot take more water than formerly for his irrigation, to the detriment of the other interested parties; since, if he had that power he could in time render illusory the rights of the other riparian proprietors.

"The bed, site, or land where the running waters flow, ought to be divided amongst the riparian proprietors, according to the frontages of their estates, in case of its remaining dry from the effect of time, by any casualty of superior force, or by changing the water from its course."[1]—[Escriche, *Agua*, § IV.

Of Springs and Spring Waters.[2]

Upon the subject of springs, spring waters, and the rights thereto, I have thought it best simply to submit a translation from the author already so much quoted, as follows:

"Every proprietor can open in his house or property a fountain or well of water, even when this causes the diminution of all the water of the fountain or well of his neighbor, who, nevertheless, will have the right to stop the work, or to demand that it be closed or destroyed, when the former should have made it without necessity or with intention to injure him.[3]

"He who has a spring on his property can make of it the use which appears most convenient to him, because the spring is his, as a part of the property, and as law I, of title XXVIII, part III says: 'Man has the power with his own property to make of it, and on it, that which he may desire in the sight of God, and under the statute.' Thus it is that he can use his waters to irrigate his lands, or to make ponds, and even can also shut either up if he

[1] *Nov. Rec.:* Law XXXI, Title XXVIII, Part III.
[2] Escriche, word "*Agua*," § II.
[3] *Nov. Rec.:* Law XIX, Title XXXII, Part III.

considers them useless or noxious. This principle has two exceptions: the first is, when a third party has an acquired right to the water of the spring; and the second, when the spring furnishes the water to the inhabitants of a town.

"The third party can have an acquired right to the spring by title or prescription. The right can consist in the power of the third party to carry the water of the spring by channel, ditch, canal, pipe, or other conduit, for his lands, or manufacturing establishments, which amongst the Romans was called *servitus acquæductus* (servitude of aqueduct); or in that of taking the water from the spring or well for the use of his family, or for the laborers in his fields, or for his beasts and cattle, *servitus aquæ haustus;* or in that of introducing his beasts or cattle on the property to quench their thirst in the spring, *servitus pecoris ad aquam appulsus* (servitude of watering place for cattle).

"The third party acquires by title the right to the spring, when the owner of the latter concedes it by gratuitous or onerous arrangement, or by testament or other final will, or when the judge may adjudicate it in a final judgment. It is acquired by prescription, when he has used the water in *good faith* with the *knowledge and forbearance* of the owner of the fountain, and during the legal time without any interruption.[1]

"'*Good faith*' consists in the persuasion of the third party that he has the right to make use of the water in way of servitude, without the use which he makes of it having its origin in force, or in secret, nor even merely because the owner of the spring, at his request, and as a neighbor, had authorized it; and this *good faith* ought to last till the completion of the prescription, according as the authors may think.

"The '*knowledge* and *forbearance*' of the owner of the spring serves as a just title of tradition, as the use of the third party serves for occupation or taking possession of the right. Then if the owner sees or knows that the third party makes use of the water by way of servitude, and is silent and tolerates it without opposition during the legal time, he manifests sufficiently that his will is to authorize tacitly the right of servitude.

"Although the law exacts the knowledge and forbearance of the owner, Antonio Gomez and Gregorio Lopez do not believe it to be necessary, in the case where the third party may confirm his use by just title, as would happen, for example, if taking you for the owner of the fountain without your being so, he had bought from you the servitude upon it, then he would really gain it by means of use and '*good faith*,' even though the true owner should be ignorant of it.

"The legal time is that of ten years amongst those present, and twenty amongst absentees in the continuous servitudes, and time immemorial in the intermittent services; that is to say that if the

Nov. Rec.: Law XV, Title XXXI, Part III.

use which the third party makes of the water of the fountain is daily or continuous, as might happen in the '*servitude of aqueduct*,' it is necessary for the prescription that the third party may be in non-interrupted possession of the enjoyment of the water for the term of ten years, living in the province of the owner of the spring, and for the term of twenty years living outside the province; and if the use is not continuous, except at intervals, as happens in the servitude of watering, in that of extracting water for field laborers, and even in that of 'aqueduct' when the water comes only once a week, monthly, or annually, and not each day, then the possession for ten or twenty years is not sufficient, but it is indispensable that it may be from time immemorial.[1]

"Although Gregorio Lopez and Antonio Gomez limit the necessity for immemorial possession to the case in which the third party may not have a just title, desiring that in the case of having it from any one believed to be the owner of the spring, without being so, the ordinary ten or twenty years may be sufficient.

"We have said, and we repeat, in accordance with law, that in order to acquire a right to water by prescription it is necessary to make use of it in the way of servitude, and not by force, nor clandestinely, nor by mere favor that the owner of the spring may have conceded in a precarious manner. In fact, neither force nor private use can serve as foundation for the acquisition of a right. What difference does it make if for ten or for twenty or more years you come, violently by day and furtively by night, to take the water from my field in order to carry it to yours? As long as I do not give my consent, tacit or expressed, you do not advance any, no matter how often you may do it, and it cannot be said for certain that my consent is given to you when you proceed in your acts with violence, or in such a way that I may not know it.

"But not even the express permission, that I might give you to use the waters, ought to be considered sufficient, in order that at the end of a certain time you might cast a doubt on my benefit, if I did not give it to you in the spirit of recognizing your right, and of placing myself under a servitude. The familiarity which is wont to exist amongst neighbors, the friendship, the desire of being agreeable, and the necessity of their having frequently to ask and lend mutual services, is the cause of the owner of a conceded spring permitting or tolerating another to draw the water to drink for his people, or to water at it his cattle, especially if it should come in abundance, without by that wishing to deprive himself of the liberty which he has of causing the effects of his tolerance to cease, when it may not be convenient to him to continue them, it may be on account of the diminution of the water of the spring, it may be on account of the proprietor of the neighboring estate being changed, it may be for any other reason.

"Thus, if I should allow the water of my spring to run because

[1] *Nov. Rec.:* Law XV, Title XXXI, Part III.

I do not need it for my irrigations, nor other uses, and you collect it at its exit from my field, to irrigate yours, you cannot pretend that by the lapse of time you have acquired the right to hold it, and to utilize it forever, in the same manner; and that I have lost that of doing in my property anything which may impede the exit of the water, and the use which you make of it.

"I have had the power to use it, or not to use it. I have been able to allow it to run out of my property, because it was useless to me. I have been able to allow you to make use of it, because I had abandoned it. I have been able to permit that you should make on your field works to collect it, because I had no right to prevent them, since each one can do on his property that which appears most convenient to him, but not on that account have you acquired the right to the water which has not yet flowed out of my field, but only to that which may be already outside of my possession; and thus it is, that I can retain it, convert it to new uses, and even dry up the spring, which, perhaps, may be prejudicial to me.

"When will it be said, then, you ask me, when will it be said that I have acquired by prescription the right to the water of the spring? When you or your ancester should have made on my property an aqueduct or other obvious work which may have for its object, to facilitate the course and descent of the water towards your field; because, then it is presumed, that these works will be constructed in virtue of an agreement celebrated with me, or with my ancestor; and when, from the fact of my having permitted you the use of the water, I have experienced any considerable injury, then it is to be supposed that my forbearance was not the effect of complacency or good neighborship, but of a right which you had, and whose exercise I could not prevent.

"The owner of a spring, who has conceded to his neighbor, or has allowed him to acquire by prescription, the use of the water, has deprived himself, by that, of the right of enjoying it the same as ever for the needs of his property, for he has contracted the obligation of not doing anything which can impede the exercise of the servitude.

"But, if the owner, changing the cultivation or the employment of his land, should absorb in it, all or nearly all the water, the neighbor can demand of him that he use it with moderation, and leave him the accustomed quantity, or at least sufficient for his property, because the right of servitude has not to remain illusory.

"The owner of a spring, who has conceded to his neighbor, or who has allowed him to acquire by prescription, the power of taking water for the irrigation of his lands, cannot concede afterwards an equal power to another neighbor, without the consent of the first, unless the water should come in such abundance that it is sufficient for the properties of both.[1]

[1] *Nov. Rec.:* Law V, Title XXXI, Part III.

"Even by general rule, the servitude cannot be alienated, unless the property in whose favor it is constituted may dispose that (Law XII, Title XXXI, Part III, not preventing) if the servitude should be for water which has its source on one property and irrigates another, the owner of this last can cede the water to that of the neighboring estate after it may come to his. But this arrangement ought to be understood without prejudice to the owner of the spring, for the latter conceded to the neighbor the use of the water for the necessities of his property, and not in order that he might sell it; and thus the grantee cannot dispose of the water in favor of a third party unless he on whom the servitude is imposed is not obliged to bear, on that account, a greater burden.

"To acquire the servitude or right of taking water from one property for the benefit of another, it is not necessary that the two properties be so near together that they touch; and thus a proprietor can bring water from an outside property by way of servitude, to irrigate his own, even when it has to pass by a road, or other intermediate property, although he will have to obtain competent permission from the authority, if it is a road which separates the two properties, or of the proprietor of the intermediate property, if it should not be himself.

"In this last case there will be two servitudes, that of taking water in the property where the spring rises, and that of conducting it by the intermediate property, *servitus aquæ ductus*. The owner of this intermediate property cannot make use of the water which passes by it, without a particular concession from the owner of the spring, acceded to by the owner of the upper estate, unless, as we were about to say, the water may be sufficient for the two estates, then, in such case, the concession of the owner of the spring, or lower estate, will be sufficient without the necessity for the approval of the upper estate.

"He who has in his favor the servitude of aqueduct, or, it may be, the right of conducting water through the estate of another, ought to guard and maintain the channel, ditch, canal, tube, or other conduit in such a manner that it may not leak, raise, lower, or do any damage to the estate where it passes. If it should be a channel of water for a mill, or a ditch for irrigation, he has to sustain and keep it up with stakes, without putting stones or large rocks in it which might cause obstructions or impediments on the property, and the quantity of water being of much consideration he ought to conduct it by conduits of earthenware, or by leaden pipes sunk in the ground, or by ditches, in such a way that he may utilize it without loss or diminution on the properties which it may cross.[1]

"The second exception or limitation which we made above, to the liberty which the owner of a spring has to make the use of it most convenient to him, is, when the spring furnishes or can fur-

[1] *Nov. Rec.:* Law IV, Title XXXI, Part III.

nish water to the inhabitants of a town, which has no other means of providing itself with this so necessary article; in which case the owner cannot dispose arbitrarily of the spring to the injury of the town, nor object to facilitate its utilization on the great principle that private interest must yield to public interest.

"But, as no one can be despoiled of his property, nor of his rights, not even on account of public utility, without first having given to him proper indemnity, according to what is laid down in Law II, Title I, Part II, and in Law LI, Title X, Part III, the owner of the fountain can ask that he be compensated by the town for the injury which it may cause him, if the town has not freed itself from the obligation of compensation by having acquired the use of the water by means of title or prescription.

"Moreover the owner always preserves the property of the spring, not having transferred it entirely, and even if he should have been compensated, he can make use of it, for the benefit of his property, in such a way that he may not prejudice the use of the town."—[Escriche, *Agua*, § II.

Of Rain and Torrent Waters.[1]

In the matter of rain and torrent waters, also, I simply present a translation from Escriche's treatise:

"The owner of the higher property can retain on it the rain-waters and other similar waters, using them as may be most convenient to him, even when the owner of the lower property had always utilized them, and had opened a ditch or any other work to receive them and to guide them over his fields, unless the latter had a completed title of servitude which gave him the right to take them at their exit from the higher estate, because the servitude or subjection of the lower estate to receive the waters from the higher one is generally established in favor of the latter, whose owner can therefore renounce it, and because prescription cannot take place with respect to the said waters; for it ought to be supposed that if its owner has not retained them formerly, it was only because he considered them useless just then, and in virtue of the power which he had to retain them or let them run, without, by that, wishing to lessen his right, just as a proprietor who allows many years to pass without building on his land always preserves the power to do so when it may suit him, without his neighbor being able to prevent it, the latter pretending that he has gained by prescription the right of view.

"This doctrine ought also to be applied to the rain-waters which run on the public roads, and thus the higher proprietor can intercept and take them exclusively for himself, even though the lower proprietor may have frequently taken them to his ground, although the said waters belong to the first one who uses them, and it is

[1] Escriche, word "*Agua*," § I.

equally understood that the lower proprietor did not make use of them except in consequence of the power which the superior owner had of taking or leaving them.—[Escriche, *Agua*, § I.

NOTE TO SECTION III.

Those portions of Escriche's writings which I have abstracted under the heading, "Of Rivers and their Waters," are well authenticated by the laws which he cites, and are in accord with later compilations. Those parts translated under the headings, "Of Small Streams and Riparian Rights," "Of Springs and Spring Waters," and "Of Rain and Torrent Waters," seem to have been very largely his own views of what ought to be, for the sake of "equity and the interests of agriculture;" and, hence, I have presented translations, and not abridgments of them. His system of riparian rights seems rather to have been founded on French than on Spanish law; for he accords all riparian proprietors on small streams an equal right of servitude to the waters, which is the French law, but for which I find no sufficient authority in the old Spanish laws; and the new Spanish laws, as may be seen in chapter XIX and appendix III of this volume, clearly do not recognize or establish any such doctrine. There are other points in which this writer seems to have drawn on the French system, and wherein he does not cite authority in the laws of Spain, which will be noticed in subsequent chapters, in connection with the application of old Spanish laws in Mexico. Escriche is certainly a recognized authority on the old laws of Spain, but his work is certainly very unsatisfactory on the subjects of this report.

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CHAPTER XVII.—SPAIN[2];

OLD LOCAL WATER LAWS AND CUSTOMS—PROVINCE OF VALENCIA.

SECTION I.—*District of Valencia—Irrigation Associations.*
The District—Its Works and Water-Rights.
Association, Organization, and Administration.
Royal Canal Organization.

SECTION II.—*District of Valencia—Administration of Waters.*
The Board of Syndics.
Syndicate-General for the Turia.
The Tribunal or Jury of Waters.

SECTION III.—*Districts of Jucar and Murviedro.*
Jucar—District and Works;
Administrative Organization;
System in Distribution.
Murviedro—District and Water-Right;
Administrative Organization;
Judicial Organization.

SECTION IV.—*Districts of Alicante and Elche.*
Alicante—District and Water-Right.
System in Distribution;
Administrative Organization.
Elche—District and Water-Right.
Administrative System;
Judicial or Arbitration System.

SECTION I.

VALENCIAN IRRIGATION ASSOCIATIONS.

The Irrigated District.[1]

The *huerta* or garden plain of the city of Valencia constitutes one of the oldest and, justly, most celebrated irrigation districts of Spain. Its works date from the time of the Moors; its water-rights

[1] See, Aymard, Chap. I; also, Llaurado, pp. 603-607; and, Moncrieff, Chap. IX.

are founded on custom which antedates existing property records in the country; and its irrigation practice and regulation is the outgrowth of centuries of experience unfettered by regulative laws or administrative action other than those local and self-imposed by the irrigators.[1] A short statement of these may afford us an useful lesson. I write it chiefly from the extended and interesting account by M. Aymard, here making the general acknowledgment that, except where special credit is given other authority, that which follows concerning this district is but a liberal translation and abridgment of his work.

The *huerta* of Valencia is on a plain 7 to 9 miles in width, gently sloping from the foot of the Sierra Molino mountains to the sea on the eastern coast of Spain. This garden plain comprises about 26,350[2] acres of irrigated land, supplied by the waters of the Turia river, through eight main canals and their distributaries; and in the midst stands the city of Valencia. The property is for the most part minutely subdivided in ownership, and is held by peasant proprietors or the hereditary tenants of wealthy owners.

"The population of the whole province of Valencia is 120 per square mile, but in the irrigated portion it is vastly more, and in the 26,000 acres watered by the eight canals of the Turia, there are sixty-two villages, containing a population of not less than 72,209 souls; that is, at a rate of 1,774 per square mile; and this includes no part of the city of Valencia."—[Moncrieff, p. 128.

The Turia is a torrential river, with a width of 200 to 400 feet through the plain, over a shifting bottom, and with a much less width, over a cobble and gravel bed, where it emerges from the foothills of the mountains. Its floods, rising 15 to 20 feet, were at one time a devastating agent to the city and its surroundings, but levees now keep these waters to their proper course. Its low water discharge is 250 to 350 cubic feet per second, which is all taken up by the canals for irrigation.

The eight canal headworks are placed four on each side of the river, alternating and not opposite to each other, about equidistant apart, and within a length of 3.2 miles of the river channel: the highest being 5 miles from the city and the lowest 2 miles distant. These headworks are small but massive masonry struct-

[1] It is not to be inferred from this, however, that local action and self-imposed regulation is all that is desirable in any irrigation district, for that which is good about the Valencian system has been dearly paid for by several centuries of wrangling and discord.

[2] Llaurado, p. 621. (For the eight canals here treated of.)

ures, each with two sliding gates, of sizes—proportioned to their rights—from 3½ to 7 feet in width. To each headwork is a dam of masonry across the river's channel, whose crest and length of overfall is so regulated, with respect to the elevation and width of the sill of the canal gates, as, approximately, to divert the proper proportion of the waters into the canal without the necessity of manipulating the gates for every slight variation in the river's flow. The exact and relative dimensions and elevations of all the dams and their headworks, gates, and sills, are recorded in the archives of the city, but this item of systemization is of comparatively modern origin.

"All these weirs date from the time of the Moors, and nothing is certainly known as to their foundation, but tradition says that the solid masonry is carried down 13 to 17 feet below the river bed, and that it rests upon piles, the heads of which are imbedded in the masonry."—[Aymard, p. 20.

Apportionment of Waters—Ancient Regulations.[1]

The apportionment of water to the canals has been made in terms of a unit of measure whose real volume is indefinite. This unit is called a "thread of water," and the volume of the stream when all in use is divided into one hundred and thirty-eight "threads," each canal taking its proportionate part of the whole, according to a fixed schedule. "In studying other centers of irrigation in Spain, in all of which like in Valencia the primitive dividing of water remains unaltered from the time of the Moors, we find everywhere these divisions are not made by fixed volumes but by aliquot parts of the total discharge. It is thus in Alicante, Elche, Murcia, Lorca, and Granada. If from Spain we pass to Algeria we find the divisions effected on the same principle; and we may, therefore, conclude that the apportionings of water have always been made by this people upon the principle of proportional parts. By this system of proportionality each one enjoys abundance of water or suffers from scarcity in the ratio of his interest to the whole."—[Aymard, pp. 24–25.

In thus writing, our author referred, of course, to southern and eastern Spain, where his examinations were conducted, and to a period twenty or more years ago. There were even then many irrigation works throughout other parts of the country, which were

[1] See, Aymard, Chapter II; also, Llaurado, pp. 607–613; and, Moncrieff.

due to the modern Spaniards, and where water was divided by measurement of volumes.

As heretofore remarked, all of these Valencian canals date from early medieval times, for it is of record that the christian Spaniards found them in working order when they took possession of the country after expelling the infidel rulers; but the regulations whereby they are now severally administered are of recent origin, although they have had codes or governing customary usages from time out of mind. The seven smaller canals have each a code, and two of the main branch canals each have theirs, so there are nine codes, whose aggregate volume occupies over four hundred printed pages; the shortest has 53 articles, and the longest 183, while the average is 90 articles of agreement, each. Eliminating that which is merely local, selecting matter of general interest, and with the view of illustrating certain specially instructive features, we have the system brought out as follows:

Right of Property in the Waters.[1]

After the reconquest of the country from the Moors in the early part of the thirteenth century, apparently in order to quiet the people, by returning to them privileges of which they may have been deprived, the Spanish king granted, to the irrigating landholders under them, the seven smaller canals around Valencia, together with their waters. The grant says: "We give and concede forever to all of you united, and to each one of the inhabitants, * * * all and every of the canals, unincumbered and free, great and small, with their waters, headgates, and conduits of these same waters, as well as the spring waters, with the exception of the Royal canal" [to be hereafter mentioned] * * * "from which canals or springs you will possess yourselves forever of the waters, * * * whether by night or by day, in such a way that you can always irrigate and take the water without servitude, without contribution, and without tribute; in fine, you will enjoy the said waters according to what had been anciently established and practiced from the time of the Saracens."

At a later date the other canal was similarly granted to the land-holding irrigators below it, and thus the water-rights became

[1] See, Aymard, Chap. II, Sec. 1; also, Llaurado, p. 610; and, Moncrieff, pp. 128 and 171.

established of record, although these grants are held to be but recognitions of former privileges.

So, on the irrigated plain of Valencia the water is annexed to the land. No one can sell land without at the same time selling water-rights; nor can any one sell water, separately, and cut off the supply to the land, which is to enjoy it forever. "This prohibition applies not only to a final sale of the water, but even to the sale of a simple irrigation turn." This principle was embodied in the acts of concession, and the practice could not lawfully be other than it is. "The waters were conceded to each of the proprietors, with the settled condition that each should apply his share of water to his land. If a proprietor does not make use of his shares, the water not utilized remains with the common store for the common use of other proprietors. This idea is so rooted in the spirit of the populace that the administrators of the water assured us they had never been troubled with such a question."—[Aymard, pp. 36–37.

The regulations of some of the canals provide heavy penalties for an attempted sale, temporary or permanent, of a water turn or right, and irrigators are not allowed even "to lend their water to others without the permission of every other irrigator from the canal, and the formal consent of those who might be injured by such action."

Associations—Amendments—Assemblies.[1]

The administration of each of the seven canals which were the subject of the first grant to the irrigators, is carried out in a rather democratic way, but there is a central organization which decides questions and administers affairs common to all, as will now be explained. With this system the eighth canal is not connected, it being administered on a different principle, as will be seen in the last subdivision of this section.

From the earliest times the irrigators under each of these seven canals have formed a separate community, and with customs and rules peculiarly their own. Within the century each of these communities has reorganized, with well drawn ordinances based on the old rules; but now these codes are antiquated, as compared to many formed since the promulgation of the new general water law, and rank as old irrigation regulations. To amend any such

[1] See, Aymard, Chap. II, Secs. 2 and 3; also, Llaurado, pp. 611–615; and, Moncrieff, Chap. XI.

code of regulations, all the users of water in the community gather in a general assembly and elect a commission charged with the study of amendments, or perhaps with full powers to make amendments and put them to the test. Generally, the commission is charged simply to report amendments, and, this being done, these are put to a vote of the irrigators. Such amendments, adopted by the community, are submitted to the prefect of the province for approval, and, if important, must be transmitted to the central government for final ratification.

The irrigators in each community meet together in general assembly usually every two years, and at such other times as they may be called by their syndicate. They discuss openly all questions relating to the affairs of their canals, ditches, headworks, irrigation, etc., elect their syndicate members, and vote the taxes or assessments necessary for expenses of maintenance, administration, etc. The outgoing board of control usually presents several lists of candidates for membership of the new board, and these are voted on by ballot. Each land owner who is an irrigator from the canal is entitled to membership in the general assembly, and each casts one vote no matter how large or small his holdings, except in the cases of several of the communities where a minimum of land interest entitling a proprietor to vote, is fixed. The confusion which resulted from introduction and discussion of trivial matters in these assemblies, brought about a rule which prevails in most of the communities, to the effect that all subjects have to receive the approval of the syndicate before being proposed in general assembly. These assemblies are in some communities presided over by the oldest member of the syndicate, in others by the mayor of the city, and in others by the governor of the province, just as the regulations provide in each instance.

Powers and Duties of Officers.[1]

The chief functionary of a water community in Valencia is the *syndic*, who is the active superintendent of the works and waters, and is elected by the members in general assembly, for terms varying from two to four years in the different communities. "We do not find in French communities a functionary comparable to this Valencian *syndic*. On the one hand by the inferiority of his

[1] See, Aymard, Chap. II, Sec. 4; also, Llaurado, pp. 612–613; and, Moncrieff, Chap. XI.

social position, by the manual labor which he is obliged to perform, by the fines which are imposed upon him if he omits any of his duties, one would be inclined to think him a very subordinate employé. But he is at the same time the chief administrator of the canals of his community, the supreme regulator of the division of their waters in time of scarcity, and, above all, he is constituted, together with the *syndics* of the other communities of the *huerta*, judge of all contests relative to irrigation practice, from whom there is no appeal."—[Aymard, p. 40.

The necessary qualifications to become a *syndic* are: to be a laborer of unstained honor, to possess in one's own right a certain extent of land within the irrigated area of the community, not to be the owner of a mill or other machinery requiring water-power, and to be able to read and write. All these points are specified in the several codes of regulations, but the educational qualification has found place there only within the last half century. "That which above all is indispensable, is to be a *laborer*, to guide the plow with his own hands. A landlord, merely, could not be elected. This qualification is so indispensable that, in the official language as well as in the ordinary speech, the word *laborer* has become allied, as it were, to that of *syndic*, and in the greater number of the regulations we find the name written *syndic-laborer*."—[Aymard, pp. 40–41.

The members of the syndicate or board of control of each community, varying from five to twenty in different communities, are elected for terms similar to those of the *syndic-laborer*, and their functions are much the same as those of an ordinary board of directors of a company in our country, except that the superintendent is not wholly under their control, but is in effect one of them. In some of the communities the subordinate employés are selected by the general assembly, in some by the *syndic-laborer* or superintendent alone, but generally by the board and the superintendent together.

These employés are numerous; some having permanent employment, and some only temporary. The *acequiero*, under the direction of the *syndic*, has charge of the cleansing and general maintenance of the canals and branches, and is the clerk of the works. The *veedores* are inspectors, whose duty it is to inspect contract work of construction and maintenance, and advise with the *syndic* in apportioning water and shifting turns of irrigation in times of scarcity, in order that crops and fields most needing it

may be helped through the critical periods. The *atendadores* turn on the waters to the private ditches for irrigation. These are the actual judges of the details of apportioning water to each irrigator, and no one may irrigate without the sanction of the *atendadore* of the ditch. The number of these attendants is fixed by the *syndic* for each branch canal, but their appointment is ordinarily left to the irrigators on that branch, forming a special assembly for that purpose. There is also a guard of the main canal and headworks, whose duty it is to constantly watch these, keep them clear of lodgment of drift, report threatened or actual disaster, and see that the system is getting its share of water from the river. There is also a collector to gather in the taxes or assessments, and a notary or advocate to draw the papers, agreements, etc., advise the officers, and attend to the legal business of the association.

Assessments—Maintenance—Distribution.[1]

The assessments or taxes are divided into ordinary, those for regular maintenance, administration, and repairs, and extraordinary, those for special repairs and construction. In some cases the ordinary assessments are subdivided so as to keep that which is necessarily variable, as for dredging and cleansing, for instance, separate from that which is for salaries and other invariable expense. In some cases an extreme limit of taxation is fixed in the regulations, in others it is not. With one exception the levy is at so much for ordinary and so much for extraordinary purposes per unit of land area irrigated, no matter what the crop, or the demand for water. In the instance of the exception the levy is partly in proportion to the volume of water used. The collection of assessments is made very promptly, and energetic measures are adopted against those who may be in default. Non-payment subjects the delinquent to summary and absolute deprivation of water. If he then takes water without settlement of dues he is subjected to a fine as great as $24. If it can be proven that the taking is done with the consent or connivance of an *atendadore* or other guard, the officer himself must pay the fine.

The main works and primary branch canals are maintained and cleaned at the expense of the general fund, under the direc-

[1] See, Aymard, Chap. II, Secs. 5, 6, and 7; also, Llaurado, pp. 613 and 619; and, Monerieff.

tion of the proper officers, either by day labor or by contract. The secondary branches and field ditches are maintained and cleaned by the owners of adjoining property, each one in front of or through his land. If any fail to do the necessary work, it is done by the proper association employé at the expense of the delinquent, and he may also be fined for neglect. The syndicate may be appealed to in such cases, and experts appointed to view the locality and report thereon.

There is no water-regulating machinery or measuring apparatus, but the employés of the association by long practice become skilled in judging of necessities of the various crops on the different soils, and of the volumes of flow required, and so these matters are in reality carried on in a systematic manner, though by rude methods and means. This system, of course, opens the way for great injustice and favoritism, but it appears from the accounts, which are extended and in detail, that the working is satisfactory to Valencias. This is no place to enter into the discussion of crop cultivations, and management of details of irrigation practice. Thus much has been said in order to show the system of organization and internal management of irrigation associations, and the tenor of the local customs which have grown into laws and been generally copied, as we shall hereinafter see.

Responsibility of Employés.[1]

The principle of pecuniary responsibility of employés and administrators is applied upon a wide scale in the affairs of all the Valencian irrigation associations. For example, the guard of the headworks and main canal is fined for not keeping the due amount of water flowing into the system. This fine amounts to several dollars for the first offense, is doubled for the second, and the third delinquency of the kind results in his dismissal. In one regulation the attorney is allowed certain fees for keeping the register of ownerships posted; and he is paid a small fee for each entry made, but for an omission he is fined twenty times as much. The *syndic* himself is not exempt from such penalties. The older regulations, especially, are stringent in this regard. For instance, in one case he is to be fined an amount equivalent to five or six dollars for neglect to report to the syndicate board the necessity for any certain repairs. Should he allow the construction of works

[1] See, Aymard, Chapter II, Secs. 8 and 9; also, Llaurado, pp. 616 and 619; and, Moncrieff.

or diversion of waters, for which there is no right, he is heavily fined, and for the third offense is disgraced and dismissed. Regulations of later dates, however, show a tendency to exempt the syndic from pecuniary responsibility, and to depend more upon honor of the individual and the dignity of the office, to insure faithful performance of duty. Even the members of the syndicates or boards of control are subject to fines in some associations. Any one who is a member of the association may lodge a complaint before the tribunal of waters, hereafter to be spoken of, and half the fine goes to the informer.

The Moncada Canal Organization.[1]

The Moncada canal, with the seven whose organization and administration have now been spoken of, completes the network of conduits which effect the irrigations around the city of Valencia, with the waters of the Turia. Being the subject of a separate and later concession, the organization of the irrigators controlling this work happens to be on a basis different from the others. At the time of the Moncada canal concession to the people there were twelve villages of irrigators served by it, and its control went into the hands of the chief executive magistrates or *regidores* of these villages, acting in the capacity of a syndicate; and these yet control and govern it, notwithstanding the fact that there are now in all twenty-three villages whose lands are irrigated by its waters and that, thus, eleven of them are not represented in the controlling board. The twelve *regidores* take the name of *syndics* while acting as such, but much of the special fitness for duty which is made an essential in the selection of members of the boards of irrigation, by the ordinances of the other canals, it is considered, is lost in the persons of these *regidores* of the Moncada who are elected as political officers, and regard their duties as *syndics* as secondary to their services as *regidores*. Neither are they elected solely by the land-owning irrigators, but by all qualified electors in the towns which they represent; while many irrigators and land owners served with water under their direction have no vote in their selection. Aymard considers that the working of this system is far less satisfactory than that of the regular associations which govern the other canals, because of the above reasons and some which follow.

[1] See, Aymard, Chap. III; also, Llaurado, p. 618.

The *regidore syndics* appoint the *acequiero* and other officers of the administration. There is no tribunal of waters; the *acequiero real* is the judge; his decisions may be appealed from to the twelve *syndics* themselves, and from these an appeal may be taken to the royal court of justice at Valencia. This system has brought about repeated clashings between the *syndical* water court and the regular courts of justice; and experience has shown the wisdom of retaining the two systems entirely separate from each other, as in the case of the seven associated communities and their independent tribunal of waters.

SECTION II.

District of Valencia—General Administration of Waters.

The Joint Board of Syndics.[1]

When there is plenty of water in the river each canal takes all its irrigators require, without regulation, but at times of scarcity the *syndics* of all the associations meet and jointly decide as to the division of the water under the terms of the ancient concessions, as long accepted and sanctioned by use. This apportionment is not equal or in proportion to capacity or to areas of cultivation, and in some cases the stream of supply to a canal is intermittent, while others get a steady flow; but it is all determined and registered in the archives of the city, and is simply a carrying out of customs which originated under the Moors. There are other diversions from the river by canals situated in the foothills and mountains above the coast plain, whose rights are subordinate to those of the Valencian *huerta*. When it is necessary, the *syndics* of the lower associations meet and go together, under authority of the *alcalde*, with the concurrence of the administration of the other and larger lower canal, to claim the waters being utilized in the mountains. If difficulties are likely to arise the provisional government sends troops to preserve peace. Should, as sometimes has been the case, the drought be so extreme as to inconveniently diminish the flow, even with all that can be acquired from above, the *syndics* jointly in council decide as to a schedule for distributing from the river, alternately to the canals on one side for several days, and

[1] See, Aymard, Chap. II, Sec. 10; also, Llaurado, p. 616; and, Moncrieff.

then to the canals on the other side for a due period. Having thus acted with the other *syndics* to apportion the waters from the river, each *syndic* returns to his own district and attends to the distribution of waters to the irrigators of his association. "Thus, in critical times of drought, there is no other rule than the absolute obligation of each one to obey the decisions of the *syndic*. Intelligence and practical sense do everything."—[Aymard, p. 51.

The Syndicate-General for the Turia.[1]

Aside from the interests merged into the eight organizations on the lower Turia, which have now been written of, the others using water taken from the river by twenty-five to thirty small canals located at intervals along its course through the mountain valleys above, have claimed the benefits of general organization. Some of these are but a short distance from the plain, and though their rights are subordinate to those of the lower canals, they still have some rights even as against these, and more particularly have they rights conflicting among themselves. For this reason, and to bring the entire river under one representative controlling administration, upon the principle of the existing ancient board of syndics or tribunal of waters, the general government of Spain in 1853 issued a decree ordering the formation of a syndicate-general to be composed of seven members, as follows: (1) a member nominated by the authorities of the city of Valencia and taken from amongst her municipal counselors; (2) a member nominated by the tribunal of waters from amongst its number; (3) a member to represent the lower communities on the left bank of the river; (4) a member to represent the lower communities on the right bank of the river; (5) a member to represent the communities of the Moncada canal; (6) a member to represent one group of villages in the mountain districts; (7) a member to represent another certain group of mountain villages.

It will be seen that the lower irrigating communities control at least four of these seven members: in other words, that the electors of the old tribunal of waters had control of the new syndicate-general. Indeed, the royal decree is most careful to avoid appearing to go counter to the general Valencian sentiment in favor of the ancient institution. It says: "It is the express desire of her majesty, the Queen, to have it thoroughly understood that

[1] See, Aymard, Chapter IV; also, Llaurado, p. 620; and, Moncrieff, p. 180.

the primitive water tribunal of Valencia, of venerable antiquity, remains intact as is mentioned in the regulation, and finally that nothing be inaugurated or decided by the syndicate-general touching the question of the water famine régime, which will form the subject of special instructions to be sent."

The powers and duties of the syndicate-general were those of a general board of control in charge of the stream and its waters, for all purposes throughout its course, from the upper point of diversion to the sea. But as these were thought to clash with ancient customs and prerogatives of the seven syndics in the tribunal of waters, and as the electors of these syndics, virtually controlling the new syndicate-general, preferred the ancient mode of administration to the new one, the syndicate-general was for years a failure in its operation, and, to within a few years past, has been as a dead letter; but, as will hereinafter appear, this system has been revived under newer laws.

Tribunal of Waters.[1]

The special irrigation "tribunal of waters" of Valencia, as well as those of other ancient irrigation communities in Spain, is the most noteworthy feature of the system of administration which has descended from the Moors. A thoroughly popular institution, it has had such a firm hold upon the people that the framers of the modern laws have recognized the value of the principle and provided for its general adoption throughout Spain. In view of its importance, I describe it as nearly as possible in the language of Aymard:

"This institution is a remarkable monument to the administrative and practical abilities of the Moors, and has been preserved almost without change from their time to the present day, in its spirit, its rules of procedure, and its outward forms. It is a noteworthy landmark of time. The people hold it in the same veneration as though it were a sacred monument in stone or marble, and whenever a proposition has been made to change or touch it, public opinion has immediately been made apparent and prevented innovation."

Each of the codes of regulations of the several associations compels the *syndic-laborer* elected under it to attend every Thursday at eleven o'clock at the cathedral square of Valencia to join the

[1] See, Aymard, Chap. II, Sec. 10; also, Llaurado, pp. 616–618; and, Moncrieff, pp. 180–184.

other *syndics*, and with them act as a court to decide on all questions relative to the irrigation practice, brought before them, to impose fines on delinquents, and to transact, also, such administrative business as must be done in common. This meeting, called the "tribunal of waters," is composed of eight *syndics*—one each for the seven canals of the association, and one for an important branch canal. The functions of this tribunal are at once administrative and judicial. Its administrative duties are chiefly those of apportioning the waters of the river to the several canals in times of drought, and its judicial functions are as above indicated.

"The administrative duty of the united *syndics* is based on an idea of great wisdom. The Moors well understood that at times of drought it is impracticable to allow each water community to act independently; that under certain circumstances it is absolutely necessary for them to unite together to form a central authority, and they created this governing body by the union of the principal officers of each community. And this board of united *syndics* was wisely made a tribunal competent to pronounce judgment in disputes concerning irrigation, as well as to settle contests between the districts."

In the performance of its judicial functions the tribunal, as above written, consists of eight members; but for administrative duty the member for the branch canal does not act, and hence there are but seven—one for each canal and headwork joined in the general association, the larger canal association not being a member, and having rights subordinate to those of the associated canals, is not represented.

"Every Thursday at eleven o'clock a crowd collects in the cathedral square, in front of the side door of the cathedral upon the porch of which the tribunal is to assemble. This place of holding the court was the same in the time of the Moors; tradition saying that it was at the principal entrance to the mosque, and it is known that at this day in Moslem countries justice is administered at these places. Here, at Valencia, there is placed upon the porch a large divan of semicircular form. The seven or eight *syndic-laborers*, in decent garments, but not differing from their holiday attire, come from amongst the crowd and take their places on the bench. Around them are collected the water-guards ready to furnish any desired information, the crier of the court to announce cases, and the notary to take down sentences when those interested demand a record. The crowd stands at the foot of the porch a little distance away. The whole scene is grand, simple, patriarchial, and vividly impressive, justifying the sort of religious belief of the Valencian people in the infallability of the tribunal.

"The cases tried are of two kinds; sometimes it is on information of an infringement or delinquency by an employé, sometimes a complaint made by one irrigator against another. In every case the *syndic* of the water community to which the case belongs acts as the judge-advocate; attends to the case, interrogates the witnesses, etc., but, in order to preserve his independence in the matter, custom forbids his voting on the decision. When the case is heard the other *syndics* collect in a group to one side, deliberate in low tones, and immediately pronounce sentence. * * * The sentence is without appeal; and is not even recorded, unless the parties at interest demand and pay for the record. Neither is there any expense, if the fines, damages, or repairs are immediately paid; but if resistance is made the tribunal is armed with the most extensive powers to make seizures up to the full value of the amount due and enough in excess to cover expenses. The penalties imposed are always those named in the regulations of the association in which the offender is a member."—[Aymard, pp. 54–56.

The tribunal of waters has jurisdiction only of questions of fact, of regulations, and of police concerning irrigation, and does not deal with matters of title to waters and lands or other properties. Within these limits its power is absolute and coercive for those who have accepted its jurisdiction by appearing before it. But each irrigator has the right to withhold his case from the water court; in which event, after having been twice summoned by the water-guard to appear on two successive Thursdays, the case is reported to the civil authorities of the province, and the delinquent is brought into the ordinary courts. But proceedings in these courts are, comparatively, so very expensive, and the confidence in the water tribunal is so great, that but few cases of this kind have ever occurred.

Efficiency of the System.[1]

Mr. Scott-Moncrieff, during his inspection of Spanish irrigations in 1867, seems to have been particularly impressed with the administrative system of the Valencian canals, for he has made frequent reference to its good working, and in one place has written as follows: "The reader will find perhaps little to be learned from the canals of Valencia, looking at them merely as an engineer, but the system of administration is one well worthy of study. Here, more than either in France or Italy, government by a representative assembly is fully carried out, and has been for more than six hundred years, with the best results."—[Moncrieff, p. 136.

[1] See, Moncrieff, Chapters IX and XI.

In another place, speaking of the *tribunal de las aguas*, he says:

"Even without taking much interest in irrigation one could not but be impressed by this scene, which has, I believe, more than once formed the subject for the artist's pencil. The irregular little plaza, inclosed by the old cathedral on one side, and the tall picturesque houses casting broad shadows from the others; the eight judges, undistinguished by robes or insignia from the groups of simple peasants with their gay-colored plaids and silk handkerchiefs round their heads, take their seats under no covering but the bright Spanish sky. Although everywhere in Spain, as in France, one sees soldiers or other liveried officials obtruding themselves, none are on duty at this old parliament but the canal guards; and the respectful crowd wait a few paces off. * * * If an offender is to be fined he listens in silence and bows to the court; if he remonstrate, his fine is doubled."—[Moncrieff, p. 181.

"It is without doubt," says Baron Jaubert de Passa, "a marvelous sight to behold a man of wealth and rank, who, as a lord, enjoys unlimited prerogatives, on foot, hat in hand, receiving in silence the rebuke which the *syndics* bestow on him, and promising obedience to the sentence pronounced—considering that the judges are only simple laborers." * * * * * *

"The tribunal of waters is a most popular institution in Valencia—so much so that sometimes people try to stretch its powers beyond their limit of cases relating to irrigation. * * * As may be supposed, this democratic council has been attacked again and again, and tried to be abolished. One may easily fancy the arguments that would be brought forward, even in countries more independent and less overridden by officialism than Spain; how contempt would be expressed for the judicial qualifications of poor peasants; how righteously indignant some would profess themselves to be, at this rough and ready method of settling disputes; how others would assert that it was against all the principles of law and order to allow of a court like this, independent of the regular judicial administration, and absurd to consider irrigation as a thing requiring special rules of its own, different from the ordinary civil law of the country; and how the direct proof of the court's efficiency, its popularity, and its expedition in clearing off cases and leaving no arrears, would be explained away or undervalued. Other pleas than these have been set up in Spain, and no stone has been left unturned to get rid of a system so distressingly simple to the mind of the *doctrinaire*. Its last and worst enemies were among the feeble cortez of Cadiz during the French war, and that they failed in their object is said to have been due to the eloquent speech of a distinguished Valencian. * * * I think, on reflection, it will be considered * * * the wisest course is to interfere as little as possible with what is so simple, so dear to the people, and so admirable on many important points."—[Moncrieff, pp. 182–184.

SECTION III.

The Districts of Jucar and Murviedro.

Jucar—*The Irrigated District.*[1]

In the case of the irrigations around the city of Valencia we had an instance of a river tapped by four small canals on each bank, and each of these works under a separate administration. The volumes of water distributed ranged from about 35 to 120 cubic feet per second to the canal. In the case of the Jucar irrigations there is but one canal, whose delivery ranges from 750 to 850 cubic feet per second, and it is all under one management, thus affording an example with materially different governing circumstances.

The Jucar river, like the Turia, rises in the Sierra Molino mountains, and flowing thence, across the sloping plain on the east coast of Spain, waters the district immediately south of the *huerta* of Valencia, making with it and the district of Murviedro, immediately on the north, a continuously irrigated garden land near forty miles in length. The Royal Jucar canal takes water through the north bank of the river several miles above the plain, and skirting the edge of the mountains northerly toward Valencia, gives out its supply through its right bank, only, to main distributaries, which carry it to the fields. The total length of the main canal is about twenty-six miles, and the distributaries are very numerous, necessitating much administrative work in regulating them. The very massive dam, headworks, regulating gates, and main outlet structures are all of cut stone masonry, and the gates are generally moved by screws. The area of irrigation is about 50,000 acres, the cultivation is principally that of rice, the waters are often used over the third time, and the system is so perfect that but little waste is suffered, but the supply of water is abundant and the use extravagant.

There is some evidence and belief to the effect that this canal and its irrigations originated with the Moors, but the case is not nearly so well made out as in the instance of the Valencian works, and the popular belief is that the work was inaugurated by the Spanish conqueror in the thirteenth century. However this may be, the canal was so far remodeled, enlarged, and lengthened to-

[1] See, Aymard, Chap. V; also, Llaurado, pp. 590-593; and, Moncrieff, Chap. X.

wards the end of the eighteenth century, and the irrigations so much extended subsequent to that time, that it is, comparatively speaking, a modern work.

The Modern Administration.[1]

Before the enlargement and extension the canal was altogether owned by an association of irrigating communities or villages, who were represented in the general association by their municipal councils. The wealthy duke of Hijar, owning much land lying north of this irrigated district and between it and that of Valencia, obtained from government concession of a water privilege from the Jucar river, and then negotiated with the association owning the canal to make some arrangement under which he could use the existing work wherein to conduct his waters. It was agreed between the duke and the old association, that he was to enlarge, improve, and extend the canal at his own expense and thereafter pay his proportionate part of expense of maintenance and operation as far as the old work had extended, and have a certain representation in the governing board, as will hereafter be seen. And it was further agreed between the duke and certain communities who had no water, but were to be furnished it by him, that he was to deliver waters according to certain prearranged plans, keep the canal and main distributaries in repair, administer the affairs of the canal beyond the limits of the old work, deal with the association of the old work, and receive in return from the new irrigators a tithe of one twentieth of their gross crops each year, to be collected by the town councils and paid to him without costs.

There is in this irrigation district no popular assembly, as in the water communities of the Valencian plain. The town councils of all the villages served with water, together with a number of land owners equal to that of the town councilors in each instance, name one or two deputies each, according to the degree of importance of the town and neighborhood. Seventeen of them name one each, and five of them name two each. The duke of Hijar names four. The steward of the royal irrigated domain in the district names one; and, finally, the villages originally controlling the works, collectively name one extra deputy, making in all thirty-three representatives, who, under the presidency of the governor of the

[1] See, Aymard, Chaps. V and VI; also, Llaurado, pp. 595-598; and, Moncrieff.

province, constitute the *junta* or general council invested with supreme powers to administer the works and waters.

This council settles the budget, votes the taxes or assessments, apportions them amongst the several communities—the duke being considered as representing the entire area of new irrigation, for this purpose, as per the terms of his agreement with the new irrigators—authorizes the execution of new works, and votes the necessary funds. It nominates all superior employés except the chief *acequiero*, who is named by the governor from a list presented by the council. To more actively administer the business affairs of the district, there is an executive committee of five members of the council, each great interest having due representation thereon.

The chief *acequiero* is the general superintendent of the works, distribution of waters, and irrigation. He is the judge of facts and necessities, and acts with promptness and dispatch, there being an immediate appeal from his decisions and actions to the executive committee and thence to the governing council. He has a large number of subordinate assistants whom he appoints and removes at will and for whose actions he is in great measure held personally responsible. He is also required to prepare the estimates for the year's expenses, and he has the power to impose fines for infringements of the rules, up to a certain limit. Thus, the *acequiero major* is a superintendent clothed with much power and responsibility, so that his qualifications are placed quite high, his salary is set at a good figure, and he is required to furnish a bond.

Assessments—Works—Contracts.[1]

The assessments or taxes voted by the general council and apportioned to the several towns, are by the town councils levied on the different irrigators, collected, and paid in to the general council. The town authorities are held responsible for their several quotas, and the duke is held responsible for his share, so that the general council is not troubled with the details of collection. The water-right being annexed to the lands, each owner of land is obliged to pay his assessment whether he uses water or not and no matter how much or how little he gets.

Important new works are always the subject of regular plans and specifications, drawn by an engineer employed from without

[1] See, Aymard, Chapter VI, Secs. 3 and 4; also, Llaurado, pp. 598–600; and, Moncrieff.

the irrigating district, and which are approved, before work is ordered, by the general council and the governor. Contracts to a limited amount are let by the executive committee; all large contracts, by the general council. Works of maintenance and repairs on the main works are done at the cost of the general fund. These works on the primary ditches are paid for by the neighborhoods they serve with water; and on the secondary ditches the owners of adjacent property are obliged to execute them at their own cost.

Distribution of Waters.[1]

To guide in dividing the waters a register is made of the irrigated lands served by each main distributary, and of the crops in which they are cultivated. With this the *acequiero major* makes the apportionment, and establishes a schedule for distribution to the main branches. As soon as the water enters these branch canals it belongs to the councils of the communities to be served by it, and is managed at municipal expense by their *acequieros*. When the waters are thence delivered to the fields they are taken charge of by a public irrigator for each sub-district, who, contrary to the practice at Valencia, has charge of the irrigations to the exclusion of the owners of the lands. These public irrigators are paid by the proprietors whose lands they serve, and about two hundred of them are constantly employed in the district.

All these guards, canal men, and public irrigators, whatsoever the fund or community paying them, are members of the one force under the control of the *acequiero major*, his orders being transmitted through the intermediate officers to the subordinate employés; and they each report to a superior, so that daily accounts come up to the chief, by which he can regulate the distribution for the day following. The theory of this system is good, but the practice in this instance is rude. Nevertheless, the outcome appears satisfactory, for the water supply is almost always abundant.

A system of fines for offenses and delinquencies, both on the part of employés and irrigators, is in vogue, and the penalties are frequently very heavy. But there is no tribunal of waters as at Valencia, and this part of the system is not popular amongst the irrigators.

[2] See, Aymard, Chapter VI, Secs. 5 and 6; also, Llaurado, pp. 599-601; and, Moncrieff.

Murviedro—*The District and Water-Right.*[1]

Murviedro is a small city of 7,000 inhabitants on the banks of the Palancia river, on the northern border of the province of Valencia, whose lands, with those of three neighboring villages, constitute an irrigation district of which the very ancient organization has been abandoned for one of quite modern forming. The present regulations bear date of 1853 and were revised in 1861. Aymard says: "The remodeling of the regulations has been made with complete freedom from old local forms, which was not the case in Turia and Jucar, where ancient usages and customs greatly influenced the new regulations. A study of the regulations of Murviedro shows clearly the policy of the Spanish administration respecting irrigation, and the high appreciation had of its value." —[p. 107.

In Murviedro the water-right is attached to the land irrigated, and cannot be alienated therefrom; and the affairs of the district are in the hands of the owners of the land and water-right, each of whom, no matter how great or small his interest as an irrigating landholder, is entitled to cast a vote for his member of the governing board.

The Administrative Organization.[2]

The affairs of the district are in charge of a general council of eight members, of which there is an administrative committee of five. The district is divided into five sections, of which the city of Murviedro and its lands constitute one, having a representation of three special delegates in the council. Each of the other four sections has one representative, and the *alcalde* of Murviedro is, ex-officio, the presiding officer and eighth member. These councilors, excepting the *alcalde*, are elected in each section by general vote of all the irrigators in that section. To be eligible as a member of the council, one must be of age and the owner of at least four *hanegadas* (6.35 acres) of irrigable land within the district. The members of council serve without pay for terms of two years, and are eligible for reëlection.

Regular meetings of the council are held on the first days of January, May, and September, respectively, and extraordinary

[1] See, Aymard, pp. 107–110.
[2] See, Aymard, pp. 109–112.

meetings whenever the governor of the province considers it necessary. The council discusses the proposed annual expense estimates, determines the amount of revenue to be raised, divides the gross sum between the several sections of the district in proportion to the number of days of irrigation water assigned to each, and notifies the *alcaldes* in the sub-districts of the amount of revenue required from the lands within the jurisdiction of their town, in each instance. The municipal council of each town apportions this water tax to the several property owners, in the ratio of the area of irrigable land owned by each, makes the levy, collects the taxes, and pays them over to the provincial authorities with the other revenues. Extraordinary taxes are voted and levied in the same manner, after having been recommended by the administrative committee and voted by a three fourths vote in the general council. The general council audits the accounts, and, having been approved, they are transmitted to the governor of the province, who publishes notice of the approval, and the demands then become payable.

The administration committee of five is chosen by the council from amongst its members in such manner that the several subdistricts shall each have representation on it. This committee convenes monthly, and in extra meeting whenever necessary and called by the chairman. It deals directly with the *acequiero major*, receives his reports, gives him instructions, receives, checks, and recommends his estimates to the general council; and has the power to order work up to a limit of about $300 of expense per job, over which amount the question has to be considered in general council.

The *acequiero major* is appointed by the general council. He must be of age, but not over forty-five years old; know how to read, write, and cipher; be a thoroughly practical irrigator; not a citizen of the province; have no interest in the irrigation, and own no land in the district. This officer is the active superintendent of the affairs of the district, and is charged with the duty of maintaining the works, and distributing the water to each irrigator—there being no public irrigators in this district. He is required to live near the center of the district, is supposed to be always on duty, or ready for duty during irrigation periods, and himself patrols the canals instructing his deputies and water guards, performing part of the actual work of distribution, and is held responsible for damage resulting from negligence in this duty. He can

execute all works which may be immediately necessary, but must notify the committee without delay; and he has authority to arrest offenders against the canal and irrigation regulations, and to fine them up to a certain moderate limit. His responsibilities are great; his powers extensive; and his action intended to be prompt and autocratic; but there is an appeal from him to the administrative committee constituting the water tribunal. Of course, there are regulations drawn out in very great detail to guide the superintendent in the administration of affairs, so that he cannot go far wrong in his actions, if he becomes properly informed as to the facts in each case. Aymard says the lodging of such autocratic powers in the hands of one man, in irrigation matters, is justified, in Spanish experience, by the great utility of and necessity for immediately suppressing an abuse and punishing the offender.

The Judicial Organization.[1]

The general council designates five or six experts in irrigation and land matters, "who must be trustworthy men, capable, and wealthy enough to assure their independence," and whose duty it is, when called upon, to examine as to questions of fact and practical deduction, and report to the administrative committee sitting as a water court. The experts are sworn in before the administrative committee and are always under oath while testifying. Their term of office is two years, and their rate of compensation is fifteen *reals* each per day of six hours, which is paid by the party demanding their services.

The administration committee constitutes a tribunal having jurisdiction of all questions which arise under the water regulations, and between persons interested in the irrigation of the district. Within these limits the rulings of the tribunal are without appeal, but they can never be on other issues than those of fact as to transgression of the water regulations, degree of offense, amount of damage, and application of stated punishment as laid down in regulations. Punishments consist of imprisonment, fines, and obligations of restitution, and sentences of the tribunal are executory and constitute a lien on the convicted offender's property. This tribunal meets every eight days, and in extraordinary session at the call of the chairman. In cases wherein expert testimony is required to estimate damages, the one expert is chosen

[1] See, Aymard, pp. 113–118.

for the occasion, by the tribunal, from the number nominated for the district by the general council; and, furthermore, the provincial civil engineer may be called upon to examine and give testimony, when advisable. All fines are divided into three parts, of which the district treasury takes two and the informer one.

The offenses specified in the code of regulations are very numerous, and the punishment varied. The following being amongst the number: (1) "On no pretext whatever may a water-gate be put in the canal; the offender shall be punished at least $10" (about). (2) "He who takes or attempts to take water outside of his turn, or a greater quantity than is due to him; he who stops the water which is not due to him; he who breaks or attempts to break any water-gate, lock, etc., has to pay damages, if any, restore things to their former state, and pay a fine of at least $2." (3) "He who threatens or insults a water-guard for not doing what he should not do, shall be fined from $1 to $4." (4) "If two or more persons are proven to participate in an offense they shall all be punished to the full extent of their deserts under the regulations." (5) For a second offense a fine may be doubled. (6) Any person interested in the irrigation of the district may report an offense, but he must lodge the information within six days after the time of the alleged occurrence, and be present at the trial, on pain of himself being punished if not on hand to explain.

SECTION IV.

The Districts of Alicante and Elche.

Alicante—*District and Water Right.*[1]

In the province of Valencia, near its southern extremity, about eighty miles south of the city of Valencia and its irrigated *huerta* described in this chapter, is the small city and irrigation district of Alicante, situated adjacent to the seacoast and upon a plain sloping to the shore.

The water-right holdings in Alicante are of somewhat complex nature, because they are of two different characters which have become mingled. There are the natural waters of the river, whose possession dates back ages ago, and those made available for irri-

[1] See, Aymard, pp. 160-164; also, Llaurado, pp. 584-586.

gation by storage in an artificial reservoir of comparatively recent date. In 1247 the infanta of Castile conquered Alicante from the Moors, and in rewarding his adherents and placating the people he "made over to the noblemen, inhabitants, and cultivators of the town of Alicante and the neighboring villages all the territory comprised within certain limits, with his charges and his rights, his mountains and his pasture lands, his springs and his rivers, so they could enjoy them as well or better than they ever had done during the times of the Moors."

Following this royal gift, the town council divided the water running in the Monegre river between all the owners of the cultivated lands. The normal discharge of the stream in season of low flow, when irrigation was most needed, was not sufficient to irrigate all this property. The water rights were held as a separate property from the land, there having been no plain terms to the contrary attached to the transfer, and in the course of time these rights became concentrated in fewer hands. Thus, some land was left without water, the owners of some had an abundance, and others had a short supply.

Things remained in this condition until about the close of the sixteenth century, when it was finally determined to build a large reservoir and store the waters of floods which ran to waste when not needed in irrigation. This was done upon the basis of an agreement of which the following is an abstract. All the owners of water-rights came into the association, together with the owners of irrigated lands who held no rights to water, and those of the dry lands which with the irrigated tracts formed a compact district. Proprietors of old water-rights renounced all claim to the waters of freshets, and to all waters over and above the amount theretofore established as the normal low water flow of the stream. All other proprietors disclaimed any right to the normal flow. All proprietors joined in proportion to the area of their irrigable lands within the district, in the enterprise of storing the surplus waters.

This agreement was approved by the Spanish government, but on the condition, which was afterwards inserted, that the stored water should be made an appurtenance to the lands of its owners, in proportion to their area. Furthermore, there was a restriction placed upon the sale of the old water-rights, namely, that such sale could only be made to owners of lands in the irrigated district. Thus, there is a water-right inherent to the land, and another which the land owners specially and only are privileged to

purchase from each other. Under this arrangement the owners of the old water-rights hold near three fourths of the water, but do not own one half of the land, so that they have much more water than they require, while others have not near enough. This inequality of water-right distribution, instead of having the effect of causing transfers of the salable water-rights themselves, and thus equalizing the holdings, has brought about a peculiar system of selling "irrigation turns," which is not found elsewhere.

System in Distribution.[1]

There are no lists of division of waters prepared, giving each proprietor his hours of irrigation, but simply, at the office of the syndicate, a register having the name of each proprietor with the number of hours of water to which he is entitled, according to his holding of water-rights and the length of the period fixed for irrigation. This period contains 1,038 hours, and water tickets, or *albalaes*, for hour, half hour, and quarter hour turns of irrigation, are prepared, in the aggregate representing the full time. These tickets are issued to the holder of water-rights, in amount corresponding to his registered shares, so that, in effect he receives a certificate of ownership of his certain proportion of 1,038 hours flow of the canals, before the commencement of each period. This certificate, in the form of a number of fractional tickets, he can hold, or dispose of in whole or in parts, and he sells the tickets for such proportion of his water as he will not want for the period, and which is not attached to his lands, and whoever wants it most, of course, will pay the highest price for it. Thus, in times of scarcity water tickets are high, in times of plenty they are low. These transfers are made generally by private negotiation and on market days when the people are collected in the principal towns, but sometimes during droughts they are put up at auction, and there is sharp competition in the bidding.

In irrigation under this system the distribution commences at the head of each main distributary. The guard in charge gives the water to each irrigator in turn for the number of hours for which he holds tickets, and so on to the end. If two or more irrigators desire to divide the flow amongst them for the aggregate period of their tickets, the arrangement is made with the *acequiero* and the irrigation goes on.

[1] See, Aymard, pp. 165–173; also, Llaurado, pp. 586–588.

The Administrative Organization.[1]

In ancient times the irrigations of Alicante were managed directly by the users of water themselves. The principal of general suffrage of all interested in irrigated lands was applied on the broadest scale, as I have written of it for Valencia. But this system was set aside by act of Philip V, who, in 1739, arbitrarily took possession of the waters of the district and caused them to be administered by a royal agent acting at once as manager of the works and judge of the contentions that grew out of the use of the waters. This order of things lasted until 1840, when, during the revolution of that time, the cultivators of Alicante demanded the restoration of their ancient right to manage their own irrigation affairs, and their request was looked upon with favor by the central administration.

In obedience to a royal decree of 1849, an extended regulation was drawn up by a commission of interested proprietors, at the head of whom was one who had paid great attention to irrigation organizations elsewhere. This draft of regulations was a model that has since been largely followed, but it temporarily met a sad fate. The governor of the province bitterly opposed granting the irrigators the right to elect their representatives in the managing council, and on his recommendation this feature of the proposed regulation was changed in approving the organization, so that the councilmen were appointed by the general government on the recommendation of the governor. Aymard says: "This part of the regulation of Alicante, otherwise so perfect, was a great blemish on the irrigation institutions of Spain. For this is the only locality" (in southern and eastern Spain) "where self-government of irrigators does not exist, and this self-government, when well organized, has produced everywhere such excellent results that we regret that it is otherwise in Alicante."

Since the date of Aymard's writing, as we shall see in subsequent chapters of this report, general laws of Spain have given to all irrigating communities the right of selecting their own officers, so that the order of things has probably been changed to this basis in Alicante, where, at the time of Aymard's visit, great dissatisfaction prevailed.

[1] See, Aymard, pp. 174–184; also, Llaurado, p. 589.

Elche—*The District and Water-Right.*[1]

Also in the province of Valencia, about twenty miles southwest of Alicante, last described, and about twelve miles from the sea-coast, is the town of Elche and its irrigated *huerta*, in a valley slightly cut off from the sea by rugged hills, but with free drainage outfall thence by the way of the river Vinalapo.

The irrigation water-rights in Elche are upon a decidedly different basis from that of Alicante. "It was a measure of great foresight that in the sixteenth century attached the water to the lands in the latter place, thus preventing them from getting into the hands of capitalists who could only have an indirect interest in the development of agriculture."—[Aymard, p. 185.] The waters of Elche, after the conquest from the Moors, were turned over to the owners of the irrigable lands, and, as in the case of Alicante, without any stipulation making them appurtenant to the lands, and the consequence has been that they have gradually passed into the hands of capitalists, who hold them as a commodity. "The ownership of the water-rights is to-day in entirely different hands from the ownership of the land. The landholder has no right to irrigate at all. When he needs water he buys it, the same as he does manure for his land when he wants to use it."—[Aymard, p. 185.

The water-rights are held by local capitalists, in 814 parts or shares, as it were, and owners are entitled to one vote for each half share held. There is an annual assembly of shareholders, at which are elected a general superintendent or *fiel de aguas*, a secretary, a number of guards, and the judges or commissioners hereafter to be spoken of. These officers all hold for one year only, except the judges, who hold for two years each. The four judges, with three members of the council of the town, under the presidency of the *alcalde*, form the council of administration. The members of the municipal board being elected by general suffrage of all the qualified electors, the irrigators obtain in this way a voice in the management of the works.

The Administrative System.[2]

The administrative council determines upon the expenses for the year, fixes the rate of assessment necessary to raise funds to

[1] See, Aymard, pp. 185–188; also, Llaurado, pp. 579–580.
[2] See, Aymard, pp. 186–190.

meet these demands, and makes the levy. This levy is upon the owners of the water, only, in proportion to their respective interests. If the assessment is not paid within a certain specified time, the delinquent owner is summoned before a civil court; or else the council decides that the proceeds of sales of water turns made by the delinquent on succeeding sales days, shall be held by the officers in sufficient amount to meet his dues.

Every morning at seven o'clock, in front of the office of the *fiel de aguas*, there is held a sale of water turns for the twenty-four hours commencing at six o'clock in the afternoon of the day of sale. These sales are of the rights of the individual stockholders for the time specified. If any such holder desires to use his water, or for any reason withhold it from sale, he does so at his pleasure. There are, in consequence, times when there is much water in the market and times when there is but little, and as demand goes up while supply decreases, there are great fluctuations in prices. These transfers are generally at private sale, and made by the owners themselves or by commission agents. When sales are made on account of delinquent taxes for the benefit of the maintenance fund they are generally made at auction.

This exchange or *bourse* is presided over each day by a commission composed of one of the judges elected by the water-right owners, the secretary also so elected, and the general superintendent. The minimum part of the whole twenty-four hours run of water, which the regulations will recognize in a sale, is one eighty-eighth, so there can be only eighty-eight sales per day. All owners of water can sell to any owner of land, so there is no limit to the irrigation district except that forced by the possibilities of conducting the water and the volume of water to be delivered.

The judges are selected from the best citizens—those "independent and having sufficient leisure" to attend to the duties. They must be without interest in water-right ownership, and men of intelligence and integrity. Their term of office is two years, and their service gratuitous. There being four of them, and only one acting each day, their service in the capacity of judge takes only a couple of hours in the early morning once every four days. Their functions are rather those of arbitrators than of judges, and are exercised as follows: There are twenty-one ditches branching from the principal canal; but never more than ten or eleven of these are used at one time, for the water supply brought by the canal is not sufficient to fill more of them. At the exchange two

classes of conflicts arise which require immediate settlement: (1) two proprietors located on different ditches want to buy water to be delivered within the succeeding twenty-four hours, it is not possible to make the delivery at points so far apart; which is to be favored and which must wait until another day? (2) two proprietors want to buy water to be delivered from the same ditch, but in amount greater than it will carry to them; which must wait over? The arbitrator of the exchange decides these points immediately as they come up, the selling goes on, and the results are recorded by the secretary as fast as reported, for the guidance of the superintendent in making out his schedule for the next day's work.

The Judicial or Arbitration System.[1]

There is no water tribunal, as at Valencia. All offenses of a grave character are reported to the administration committee, who have the offender arrested and prosecuted before the ordinary municipal justice of the peace. Minor offenses are punished, indirectly, in the action of the judge of sales, who can favor those who habitually obey the rules, and decide against those who offend against them.

The system at Elche is a peculiar one in Spanish experience, being based upon unregulated water-right ownership independent of the land proprietors. It has certainly brought about a curious result in the organization of its governing council and the administration of distribution. The council is composed of the four "judges" elected by the owners of the water-rights, three members of the municipal council elected by the qualified electors of the town, and the *alcalde*, who is appointed by the government.[2] Thus, although the irrigators have no ownership of the water-rights, they secure, by election of the municipal councilmen, indirectly, almost as great a representation on the board of control as do the owners of the water-rights by the election of their "judges." The objection urged is, that the water-right owners take no permanent interest in the works; water shares are made the subject of speculation, and there is no enterprise in the management. Speaking of the system, Aymard wrote:

"The great mischief of the system is to create an antagonism between the proprietors of the water and those of the land, and to

[1] Same reference as for last subheading.
[2] This was before the remodeling of the Spanish municipal system.

place those who, in an agricultural point of view, are the deserving ones, dependent on those who are capitalists and strangers to the lands tilled. These latter certainly would not see the dam put in jeopardy, because their property lies there, but they take no genuine interest in the management of the waters or in the development of the irrigation resources of the country; for they may be moved by the thought that the more water there is, the cheaper it will be. There is a certain limit, beyond which the supply of water increasing, diminishes their revenue. With a system like this, we can never see what is at present being done in Alicante—a syndicate of landholders not afraid of an estimated expense of 600,000 to 700,000 francs to further develop the water supply of the neighborhood. All spirit of progress in Elche is fatally kept down."—[p. 189.

NOTE TO CHAPTER XVII.

It must be remembered that this chapter refers to the state of affairs in some old districts of Spain, as they were twenty years ago, and that it has been purposely written thus, to convey the lesson which the results of a natural development of irrigation organization afford. Since that period Spain has adopted general laws, in part based upon Valencian experience in local administration of waters, and under these, changes have taken place in the governing organization of some of the districts. Under her constitution of 1876 the municipal system of the country has been remodeled, also, so that the *alcaldes* of towns are elective, and other important changes are made, as will appear in subsequent chapters.

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CHAPTER XVIII.—SPAIN[3];

OLD LOCAL WATER LAWS AND CUSTOMS[2]—MURCIA AND GRANADA.

SECTION I.—*Murcia—District of Murcia.*
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SECTION I.

MURCIA—DISTRICT OF MURCIA.

The District and the Ancient Régime.[1]

In the province of Murcia, about fifty miles southwest of Alicante, last written of, and thirty miles from the border of the Mediterranean sea, is the city and irrigated district of Murcia, on the banks of the Segura river, which is one of the largest in southeastern Spain.

The most ancient known document relative to water-rights in Murcia is a royal *cedula* of 1277, which reads as follows: "Know all men by these presents, that I, Don Alonzo, by the grace of

[1] See, Aymard, pp. 211–214.

God King of Castile, Toledo, Murcia, etc., wanting to give to the municipality of Murcia a mark of our favor, and to have all quarreling stopped between users, order that the water shall be divided equally between yourselves, in such manner that each one has it in proportion to his land and on the day assigned to him." This document constitutes the foundation of the Murcia water-right. The waters of the river have thenceforward been attached as an appurtenance to the irrigated lands within the jurisdiction of the town, their administration has been in charge of the municipal council, and this arrangement has been confirmed by several royal decrees or *cedulas* promulgated at various times during the centuries that have intervened.

The water is in the fullest sense a common property, and the right to it is inseparable from the land ownership. If an irrigator does not use his water on his land, it will not be distributed to him. He cannot take it and waste it; he must usefully employ it, or it must remain with the common stock, under the title and the regulations.

Previous to 1849 the management of the whole system of distribution was also in the hands of the town council, and there was much confusion and dissatisfaction, notwithstanding the fact that the water supply was abundant and the tax rates low, for there was no full and carefully prepared code of regulations, and no systematic management of the works. The members of the council were elected in the community at large which embraced much country not in the irrigation district, and the irrigators objected strongly to having the details of water distribution managed by officers whose selection they could not control. The regulations in force were old and composed of unconnected resolutions adopted at various times scattered through centuries, and had never been codified and published. In response to an unanimous demand on the part of the irrigating landholders, the municipality, in 1849, consented to the organization which now exists, and the municipal council framed and promulgated the ordinance which governs it. This ordinance is a veritable rural code, so full and complete is it in its provisions, and is spoken of by the authorities at hand as remarkable for its clearness and completeness.

The Reformed Régime.[1]

The *huerta* of Murcia is about fifteen miles long, with a maximum width of four miles, comprising something over 26,000 acres, and through its length runs the river Segura, the source of irrigation water supply. It is dammed at the upper end of the garden lands, five miles above the town, and there sends off a large canal on each side.

The river and water supply within the municipal jurisdiction, the dam, headworks, and these two canals are in charge of the municipal council or *ayuntamiento*, selected by the electors qualified for the vote under the Spanish national system, in the town and its *termino*, and in this case the irrigation district is not a considerable part of the *termino* of the town. The *alcalde* of the town is the executive officer, and he, upon the recommendation of the council, appoints an *acequiero* in chief, or superintendent, for each of the two main canals, and these have such assistants as may be necessary. The expense of maintenance and operation of the main works is borne by a special fund raised by taxation, and levied by the town authorities with other municipal taxes.

There are twenty branches from each of these canals, each branch independently and completely serving a little sub-district, the owners of property in which compose an association managing its internal affairs, so far as these do not affect those of other sub-districts, and maintaining its own branch canal. The organization of these sub-districts constitutes the basis of the whole system for the *huerta*.

Self-Government fully Developed.[2]

The principle of manhood suffrage of all parties directly interested in the irrigation is applied on the broadest scale: Each owner or representative of an irrigated tract, large or small, may cast one vote in the assemblies of his sub-district, of his semi-district, and of the district as a whole.

Questions affecting each sub-district are considered in the assembly of the irrigating owners within it. Questions affecting the interest of owners on one side only of the river, are considered in assembly of the owners, or their representatives, within the twenty sub-districts on that side. Questions involving interests on both

[1] See, Aymard, pp. 213–218; also, Llaurado, pp. 556–558.
[2] See, Aymard and Llaurado.

sides of the river are considered in grand assembly of owners, or their representatives, in the forty sub-districts embraced in the whole *huerta*. The *alcalde* of Murcia presides over all assemblies, or names a deputy to preside in his place.

There is an ordinary assembly held annually in each sub-district, in each semi-district, and in the district as a whole, and as many extraordinary meetings as may be necessary. The owner of each parcel of land, therefore, may participate in at least three assemblies a year. In practice, however, the land owners generally are present, individually, only in the assemblies of their sub-district, while the higher assemblies of the half districts, and the general assembly for the whole, are attended only by the agents, who, each for his constituency, cast the votes of absent owners.

Each of the forty sub-districts at its assembly elects its own officers, namely, an agent or "attorney" (so called), two or more *veedores*, or water superintendents, and in some cases a secretary and treasurer or collector. The agent is the active head of the administration in his sub-district, and the *veedores* are his assistants. His administrative powers are quite similar to those of the syndics spoken of in the description of irrigation organization in Valencia. His term of office is two years, as are also those of his assistants, and they are all eligible to reëlection. But as the service is altogether gratuitous, it is considered a personal sacrifice to accept office, so no individual remains long in position at one term.

The semi-district assemblies on each side of the river, confer and resolve on matters of importance affecting interests on that side, and elect a general agent, who sees that his territory gets its due portion of the water, and otherwise acts, in the interest of his constituents, as a check on the *acequiero* of the main canal.

Administration—Assessments.[1]

The district assembly elects each year three members of a general council, or "committee of proprietors" *(comision de hacendadas)*, whose terms of office are two years. Thus, this higher council is composed of six members, and it constitutes the governing board of the district in all matters connected with the waters, canals, and irrigation, outside of purely local or sub-district

[1] See, Aymard, pp. 215–218; also, Llaurado, pp. 559–563.

affairs, and excepting, also, matters controlled by the *ayuntamiento* of the town. The district assembly also elects a treasurer. But the general council elects its own president and secretary. The *comision de hacendadas* administers the funds, watches over the interests and rights of the water users as a whole, represents them before the *ayuntamiento*, appears for them and the district in court, and generally supervises all connected with the rural policing and irrigation economy of the *huerta*.

Taxes or assessments for sub-district purposes are debated and voted in each sub-district assembly, and collected by its agent, or treasurer if there is one. The same is the rule with respect to assessments for common purposes in the semi-districts; and, finally, the general assembly votes the estimates for the purposes of the *huerta* as a whole, and the *comision de hacendadas* levies or distributes the tax necessary under this vote.

The assessment is made after a peculiar principle. All the lands in the *huerta* are graded as first, second, and third class, according to their productiveness. Third class land is assessed as the basis; second class land is assessed at twice as much, and first class land at three times as much per unit of area as third class. This is certainly a very crude method of grading valuations, but it was old and time honored when the present regulations were drawn up, and had to be adhered to.

The collection of taxes is made by a collector under the direction of the treasurer and secretary of the district, assisted by the local agent in each sub-district. There is always a personal notice given several weeks in advance to each landholder by the agent in his sub-district, stating the day when he will be called upon, and he must then pay. If he does not, he is reported to the treasurer or receiver, who immediately lays the case before the council of experts, which brings suit against all delinquents.

The Judicial System—Council of Experts.[1]

The council of experts, or *concejo de hombres buenos*, is a feature of the Murcian irrigation administration copied after the water tribunal of Valencia. This council is composed of five of the forty "agents" and two of the eighty *veedores* elected separately by the sub-districts; these seven members of the council are chosen by lot each month from the one hundred and twenty; and hence the

[1] See, Aymard, pp. 218-220; also, Llaurado, pp. 563-564.

personnel of the board is continually changing. But the *alcalde* of Murcia is its permanent presiding officer, having, however, a voice and vote in its proceedings only when there is an absentee and a tie vote amongst the other members; and he is also the executive officer of the council and carries out its orders.

The *consejo de hombres buenos* holds two meetings per week and hears all cases brought to its attention. All persons have the right to lodge information before this council concerning any infringement or violation of a regulation, that might bring injury to the community at large, and acts affecting but one individual can be reported only by himself. Complaints relating to taking water out of order or turning it away from another, have to be made in writing and be signed by the person reporting and an interested party; and they must be handed to the secretary of the council at least three days before the meeting at which they are to be considered. The council, hearing all testimony, decides immediately or at the following meeting at the latest.

The jurisdiction of this council extends to all questions arising under the regulations and which do not involve property rights or offense against the general laws of the kingdom. The latter class of questions are brought immediately before the ordinary courts. To the extent of their jurisdiction the decisions of the council of experts are without appeal, except where such flagrant injustice has apparently been done that the *ayuntamiento* of the municipality may, on petition made within three days, order the case to be reheard before a double council composed of the members at the time serving and the seven who immediately preceded them.

Regulations—Maintenance—Review.[1]

As has been said, the two main canals are maintained at general municipal expense, under the supervision of the *acequieros* appointed by the mayor. The branch canals are each cleaned, cleared, and repaired, so far as this can be done by ordinary manual labor, annually by the irrigators in the sub-districts which they severally supply. This clearance work is performed in allotments to each small group of owners, proportioned to the area of their lands, and made by the agents in each sub-district, and the work is in addition to the sub-district tax to be paid in money, the

[1] See, Aymard, pp. 211–221.

proceeds from which last are applied to sub-district expense other than that which can be worked out by the irrigators in person.

Reviewing the administrative organization, we find: (1) the river through the municipal *termino*, its waters, the dam, the two main canals, their headworks and main distributing gates, in charge of the *ayuntamiento* elected by the municipality of Murcia, at large; (2) the affairs of the irrigation district as a whole, in charge of a general council or *comision de hacendadas* selected by the general assembly; (3) the affairs of each of the forty sub-districts, in the charge of an agent or attorney and two inspectors; which agents, representing their constituents, if these do not want to attend, compose the general assembly, and are themselves chosen by the proprietors in their several sub-districts, in assemblies; (4) the adjudication of questions arising under the regulations and sentencing offenders against these rules, in charge of the council of experts, or *concejo de hombres buenos*, composed of five of the sub-district agents and two of the inspectors, drawn by lot monthly from the one hundred and twenty severally elected in the sub-districts.

In closing his account of irrigation organization in Murcia, Aymard wrote: "Administrators and judges, all emanate from universal manhood suffrage of the irrigating land owners; and self government by the consumers is exercised in its fullness. It is proper to specially call attention to the court of experts, for it affords a precept worthy of study. The authors of the regulation of Murcia were not fettered by custom and traditions in this respect. Before 1849 this court did not exist among them; they need not have created it; but they did it because it was necessary and indispensable for a proper carrying out and enforcement of the regulation itself, and the people have recognized that this court is all that was promised for it. This question, then, appears to us to have been judged by the traditions of the past and the experience of the present. The special water tribunal, with its judges versed in the practice of irrigation, its summary proceedings, its verdicts without appeal, its well defined penalties, must be considered an indispensable appendage of all good irrigation organizations."—[p. 220.

SECTION II.

Murcia—District of Lorca.

The District and Water-Rights.[1]

The Guadalantin river is a tributary of the Segura, having its point of junction just above the city of Murcia; about forty miles from which is the small city of Lorca, having a population of about 22,000 inhabitants and an irrigable *huerta* of about 27,000 acres of land. The Guadalantin is a comparatively small river, and the water supply for irrigation sometimes so nearly stops as to result in crop failures. Although commanded for irrigation and supplied with distributing works, not all of the *huerta* is watered in any one season; less than half of the lands are irrigated regularly every year, and those to which the water is an appurtenance have the preference.

In the year 1242, when the region round about Lorca was taken from the Moors by the Spanish King of Castile, irrigation was already established. As in other cases spoken of, the monarch made a division of the lands amongst the loyal inhabitants, and a few years afterwards ordered the waters to be distributed in proportion to ownership of land whereon they could be used. Later on there came complaints that the larger land owners or counts monopolized all of the water, and that the municipal authorities could not control them. There was then issued a royal order to the governor of the province, as follows:

"Seeing that the *ayuntamiento* of Lorca has complained to me that the owners of the fiefs hold back all the waters, and will not let them escape from their *huertas* for grain or anything else, and that because of this the crops have failed this year; I beg and order you to go and see how this is, and to make an equal division of the waters between all, by days and by time, in such manner that henceforth there shall be no more complaints on the subject."

The terms of this decree do not differ very materially from the one promulgated for Murcia twelve years later, and elsewhere spoken of, but the results which have come out of it, with respect to the right of property in and control of the water, are quite different. As in Elche, the water-rights and lands in Lorca have, to a great extent, gradually become held separately, so that, for

[1] See, Aymard, pp. 221–224; also, Llaurado, pp. 550–552 and 564.

nearly all the irrigations, when the cultivator wants water he buys it as so much merchandise at an auction. In several of the subdistricts or small irrigation centers which compose the district as a whole, water is still held as an appurtenance to the land, and the owners receive their share on this basis.

This result of separating the water from the land has not come about without great struggles and opposition, for the working farmers as a class have all along opposed such an interpretation or straining of the terms of the royal gift, while rich landholders and capitalists have advocated this reading of it, and the charge is made that undue influence has had its effect with the town council, in securing the acceptance of such result. At the time of Aymard's writing (1864) the contention was still going on, but the outcome had then so long been sanctioned by custom that a change back to the original system could hardly be hoped for.

Reformation of the System.[1]

From the thirteenth century to near the close of the eighteenth, the care of the works and distribution of the waters was under the immediate control of the *ayuntamiento* of the town, but there had been always a great deal of trouble, dissension, and many failures of crops from short supply and bad management. The right to most of the water had passed out of the hands of the irrigating land owners; it had become an article of speculation, and was sold daily by auction, at which a special municipal officer called the *alcalde del agua* presided. There were several excellent localities for the storage of water in the neighborhood, and a large surplus for storage was wasted in floods each year. But owing to the absence of a united interest in the district, although projects for storage had repeatedly been investigated and discussed, nothing had ever been done towards construction.

"These projects encountered an incessant opposition from the owners of the water, among whose number were found some of the richest and most influential men of the country. An increase in the supply of the water would immediately result in the lowering of the price of the unit of volume. All projects having this for an object, had those people for adversaries whose capital was invested in the ownership of the waters of the natural flow of the river."—[Aymard, p. 243.

[1] See, Aymard, pp. 243–247; also, Llaurado, pp. 570–571.

This question had grown to be of so much importance that in 1785 the general government of Spain came to the rescue and ordered the construction, at national expense, of two immense masonry dams to store water for the plains of Lorca, as a matter of national importance. It was the intention to sell the water to irrigators at prices which would reimburse the government by a fair rate of interest on the moneys invested, but, at the same time, be very much less than the rates which ruled in sales of the waters in private ownership. The dams were built and waters stored.

In order to harmonize matters as much as possible, as was necessary, the government in 1790 took the management of the old works and distribution of waters out of the hands of the *ayuntamiento* of Lorca, and placed this, with the management of the new works and stored waters, in the care of a syndicate of nine members, of whom four must be owners of old water rights, and five must be land owners and irrigators, and over these, as president of the syndicate, was established a director appointed by the general government.

Although one of the dams built by government was injured soon after construction so as to render it useless, and had never been repaired (1865), and although the reservoir space behind the other dam had become completely silted up and rendered unavailable, thus practically doing away with the property constructed by government, the same administrative organization was preserved to within a few years past.

Administration—Suffrage—Director.[1]

The members of the syndicate are elected by the suffrages of certain adult persons interested in the irrigations, namely: (1) owners of the private water rights, who during five consecutive years have received an annual rental of at least 1,000 *reals* ($50) from auction sales of their waters; (2) all owners of irrigated lands who receive from these lands an annual rental of at least 500 *reals*; (3) all irrigators, who on account of their cultivations, pay a tax annually of at least 100 *reals*.

The director must be a person of high standing, of known and acknowledged familiarity with agriculture, and especially with irrigation. He must not be a native of Lorca, nor have married

[1] See, Aymard, pp. 247–250; also, Llaurado, p. 574.

a woman of Lorca, and must not possess either water or irrigable lands in that region.

The syndicate was formed under a decree of 1790, and has had its powers extended by other decrees, the last of which before the time of our principal authority, was issued in 1859. Thus amended, it has control of all irrigation works and waters in the district, and of the dams, water supply works to the city, embankments or levees, and other works. To meet the expense of the maintenance and administration, a certain proportion of the waters of each owner were deeded to the *ayuntamiento*, the proceeds of sales of which were put in a fund for the purpose. This system also was kept up under the new régime.

The syndicate meets regularly once a week, not counting extra meetings called by the director or by a majority of the syndics. It is the deliberative and legislative body of the administration: considers all questions relative to the works, waters, and distributions; authorizes all important works and limits their cost; audits all accounts; inspects, and in a measure controls the acts of the director; and may report him to the governor of the province or the central government.

The director represents the government in the syndicate and presides at its meetings; executes the resolutions of the syndicate; presides each day at the water auction sales; represents the community of irrigators in the courts; convenes the qualified electors of the district to deliberate on matters of extra expense; proposes to the government a secretary and other office employés, and directly appoints the water-guards and their assistants.

Such are the director's administrative duties. He has also most important functions as a judge: performing the duties which in Murcia, Valencia, and elsewhere, we have seen imposed upon a tribunal composed of a number of members. The regulation of 1859 fixes the jurisdiction of this judge-director, substantially as follows: "The director shall be judge of waters. In his position he must hear all the differences that arise between parties, in relation to matters of which the regulations treat, and also all offenses in the matter of irrigations punishable under article in said ordinance. His judgments bearing on any of these articles, are without appeal, except a party believes that a wrong application of the ordinance has been made, when he may appeal to the governor of the province."

The various ordinances, and particularly that of 1831, lay down

in great detail and with remarkable completeness, a code of regulations under which the district is governed. These are printed and generally circulated, so that the director acting as judge cannot go far wrong without being checked.

There is a most curious and complex subdivision of water-rights in Lorca, which is the outgrowth of separation of the water and land ownership. From the earliest times the district has been divided into three sub-districts. To one was originally allotted $\frac{3}{18}$ of the water, to another $\frac{5}{18}$, and to another $\frac{10}{18}$. These allotments were not exactly in proportion to the areas to be irrigated, as it turned out, so a subdivision of rights made the amount of water due to the standard area of land different in each sub-district. One of the sub-districts divided its allotment into four parts and distributed water by fourths of the stream for certain periods of time variable with the area of the original owner's land. Thus was established a system of distribution with a fixed head of water and a variable period of time as factors of the unit of ownership. The other two sub-districts divided their waters into as many parts as there were shares or owners, on some certain unit of area as a basis, and thus established systems of division by fixed times and variable heads of water; and, for reasons already given, the units in each of these two sub-districts predicated on the same system even, are not the same. Thus, within the district, to start with, there are three different units of measure for water. Now, if the water were attached to the lands, this would not be so serious a matter, but it has not been held so. Water from one sub-district is sold in any other, and, hence, dire confusion results in distribution.

There are a number of other causes which vary the volumes of the unit of water as bid for at the auctions, but it is unnecessary to explain these here. After seven pages of illustration on these points, Aymard summarizes the matter thus:

"We have now nearly a complete idea of the extreme complexity of these divisions. The unity varies not only from one canal to another, but also from day to day on the same canal.

"It varies first, by reason of the volume of water in the river not being constant; second, by reason of the number of fractional parts into which the flow is divided in the several canals; third, by reason of deductions made on certain days of the week for the free irrigation of certain districts where the water is attached to the land; fourth, by reason of the season; and, fifth, by reason of

the variation in the length of the days and nights and the water shares being owned by the day or night.

"Each individual attending the auctions must perfectly know the conditions of the sale, or he runs a risk of making a mistake in his calculations. But it must be said that there is not a peasant who is ignorant on the subject. * * * Each one always knows perfectly well what he buys, without it being necessary to give him any other explanation than the name of the *hilo* on which he has bid."—[pp. 229–230.

Selling Water—Method and Results.[1]

The auction sales take place in a large room or hall arranged for the purpose, in the city of Lorca, wherein is a floor sloping towards one end, at which is a raised stage where sit the director and two secretaries. The director governs the proceedings; and the secretaries record the sales, which are not made individually by seller to buyer, but by the director representing the interests of all water proprietors. These owners of the water-rights do not appear at the sale, but the purchasers of water bid for the use of the turn or fraction of the turn of each of the several owners, as it is put up at auction. The division of the waters is such that there are made each day for that following, eighty-eight sales, the value of privileges under which, as already explained, vary much amongst themselves.

Aymard describes the scene at these auctions as being most exciting and demoralizing: bidding is very spirited and sharp, and although when a purchaser has bought one turn he is allowed by courtesy to take as much more as he wants at the same price, when he is satisfied the others again wrangle and become belligerent in bidding for the next turn.

Directly the sale is over the secretary makes out a statement to guide in the distribution of the waters on the following day, and in posting to the accounts. The list is forthwith read aloud and posted. Bills are made out for each purchaser, signed by the director, delivered to the purchaser, who pays to the treasurer and gets his receipt, which he uses next day as a certificate that he is entitled to the water, when the guard comes to distribute it.

The dividend to each proprietor is made each month according to the average of sales for the month, and in proportion to his ownership of the rights of the same class. The price paid for

[1] See, Aymard, pp. 225–242; also, Llaurado, pp. 567–571.

water was very high at the time of Aymard's writing, so that irrigation cost more per year per acre than anywhere else in Spain.

Aymard thus records his estimate of this principle and practice of disposing of waters: "If we tire in the presentation of these matters it is not for the vain pleasure of giving a description of the scene, but that these details carry with them a profound insight into the whole system. They lay bare the viciousness of this system of auctions applied to merchandise like this, and they show how an institution which is bad in principle can be in part corrected in practice, for the good of the people."—[p. 233.] The irrigator, spurred by the necessity for water for his crop which constitutes his support, goes to auction, where he finds many others brought by the same want. Necessity, rivalry, excitement combine to force him on—he pays more than the water is worth, more than his returns will justify. This is the rule. And it is the curse of which Aymard speaks. But practice has developed the courtesy that when he has bid in one lot of water he takes as much more as he wants at the same figure. This is the palliation in practice which our authority notices. But the outcome is large dividends for the water owners, a languishing agriculture, a poor peasantry, and no enterprise to develop the country.

Aymard finds in the outcome of irrigation in Lorca, as compared to that of Valencia and other places in Spain where the water is attached to the land in ownership, a lesson to which he draws special attention. He produces the argument used in favor of the Lorca system and then answers it:

"'Why,' say these owners, 'should the ownership of water be hampered with greater impediments than that of land? If it suits me to draw my revenue from sales of water rather than from crops on lands, why should I not be permitted to do so: by what right can they prevent me? Is it in the name of general interest? Well, provided the water is used, it is of little importance on whose land it is put. Furthermore, the selling of water is the best means to prevent its being wasted. When the farmer receives his water on a certain day, without anything to pay, he always gives useless irrigations, which would have been better employed on other lands, and this abuse need not be feared when water is sold. This system is the most satisfactory to all legitimate requirements of a general interest which is to irrigate by a given volume of water the greatest area of land possible.'

"These reasons considered by themselves are seductive; but those who bring them forward do great injustice by not mentioning the antagonistic attitude which the system of sales has engen-

dered between the owners of water and those of the lands. A good regulation could prevent abuse and waste of water; nothing can prevent the deplorable consequences of an organization that trusts the destiny of the land to capitalists whose interest is in direct opposition to the water resources of the country. This system is the reverse of progress; it condemns the land to inactivity, that has the misfortune to be submitted to it, and this estimation is abundantly proven by the example at Lorca."—[pp. 243–244.

This authority shows that water rates are enormously high in Lorca, and that agriculture cannot stand them; that there is no enterprise in the land; that in spite of government assistance the district has not advanced; that even the works built by government have been allowed to go out of use, while but a small part of their original cost would rehabilitate them and put them again in commission; and he attributes these results to the facts that the irrigators do not own the water-rights; that the speculators in water control the situation, and keep down the spirit of enterprise to keep up their rates for water; and he, also, very unfavorably contrasts the spirit pervading the people of Lorca, as evidenced by their works, with that of the people of Valencia, as evidenced by their works based upon ownership of land and water together.

SECTION III.

Murcia—District of Almansa.

District—Water Rights—Assessments.[1]

At the foot of a mountain range, on the northern boundary of a large interior valley, in the northern part of the province of Murcia, about sixty-five miles southwest of the city of Valencia, and the same distance northwest of Alicante, lies the town and irrigated district of Almansa.

The irrigations at Almansa are effected with water drawn from a reservoir, the origin of whose dam is unknown, but which, after a long period of use in a partly built condition, was taken in hand for completion as long ago as the year 1586. The work was built at that time by the associated owners whose lands were to be irrigated, and under the leadership of the governor of the province; and these, at the same time, together with the municipal council

[1] See, Aymard, pp. 122–128; also, Llaurado, pp. 583–584.

of the town, drew up and adopted a set of regulations for the government of irrigation in the district.

The water right has from time immemorial been an appurtenance to the land, which bears in direct proportion to area irrigated each year, the ordinary expense of maintenance and administration of works. Thus, as is not infrequently the case, when by reason of light rainfall the reservoir does not fill and the water supply is short for the season, each owner receives water in proportion to his land, if he calls for it, and may use it on all or a part of his land. If he takes all of his proportionate part of the water, he pays his full proportionate part of the year's expense. He may, however, call for and take less than his share, and then he pays less in proportion; so that if he does not take water at all, he pays nothing.

The amount of this ordinary tax is determined annually in advance, from estimates of probable expense and water supply. If, on account of an abundance of water, the product of this tax exceeds the necessities of the year, no rebate is allowed. The surplus is held over to the next year, and a less rate levied then by reason of the available cash in hands. Should the supply disappoint the expectations in any one year, and, from this cause or any other, the revenue falls short of the demand for expenses, an extraordinary tax is levied uniformly at some certain rate per *fanegada* on all the land in the district, whether supplied with water for the season or not.

Organization and Administration.[1]

The affairs of the district are managed by three *syndics* who are elected by manhood suffrage of the irrigating landholders, for terms of one year each; each owner of an irrigated parcel of land, no matter how large or how small his holding, having one vote and only one. The syndics fix the income tax at certain rates per *fanegada* (about 1.3 acre) supplied with water, and, also, have the power, upon their own judgment alone, of levying extraordinary taxes on all the lands in the district. These syndics appoint the *acequiero*, or superintendent, and, in a general way, supervise his duties.

The rates, ordinary and extraordinary, are payable to a receiver or treasurer of the district in advance for the season, and

[1] Same references as that for preceding subheading.

he who has not paid or cannot exhibit his receipt cannot have water to irrigate with. There is no special water court, but the syndics, in a measure, jointly act in that capacity.

SECTION IV.

Granada—District of Granada.

The District and Water-Right.[1]

In a large elevated valley, through which courses the river Genil, surrounded by mountains, in the southeastern portion of Spain, lies the famed old Moorish city of Granada, and its very productive irrigated district or *vega*. This region is forty to fifty miles inland from the Mediterranean coast, about an hundred miles southwest of the irrigated district of Lorca already described, and was one of the last strongholds from which the Moors were driven in the fifteenth century. The district of Granada, with the exception of that of Valencia, is, perhaps, the best known of the old irrigation *huertas* of Spain. It enjoys a reputation, indeed, which seems to be undeserved in any connection with irrigation. The plain is very fertile, the water supply is abundant, and the irrigators are prosperous; but it is the natural advantages of the place to which a satisfactory outcome is due, and not the system of works or their management.

As a matter of fact, the works are all small, poorly maintained, and miserably managed, and there was not at the times Aymard and Moncrieff wrote, any organization of irrigation worthy of the name, and it does not appear from Llaurado that this old order of things has since been changed. In fact, Granada is one of the few places in southern Spain where there have been no modern reforms in irrigation organization and administration, a place where the chaotic state which succeeded the expulsion of the Moors has been borne with until custom has sanctioned and the people have adapted themselves to a most irregular and immethodical administration of water-right and irrigation matters.

We find here both systems of holding water, which have been repeatedly noticed in former pages: ownership of water-rights in severalty, and ownership of water privileges as appurtenances to

[1] See, Aymard, pp. 264–268; also, Llaurado, pp. 487–490.

lands. Scarcely a canal of the number can be named whose waters are not held in part by one system and in part by the other. The greatest apparent confusion exists, not only in the water holdings themselves, but in the order of the holdings and in the outcome in the customs of irrigation. Nevertheless, these apparent complications have become clear enough to the irrigators of Granada, and as the water supply is plentiful, they are able to get along without much jarring.

Characteristic Features of the System.

Moncrieff visited this region in 1868, and commences his account of what he saw in the following manner:

"On the top of the highest tower of the Alhambra, commanding a glorious view over the fertile plain below, stretching away to the west, and of the Sierra Nevada, soaring up in majestic forms to the southeast, is suspended a large bell, which is struck every five minutes from sunset to sunrise. There is a conventional system by which the peasant, counting the number of beats, knows exactly the hour, and when it is time to open or close his water-course. The bell is said to be distinctly heard throughout the still night over the whole *vega*, or irrigated plain. The present bell was placed there by the good queen Isabella after the expulsion of the Moors in 1492, but I believe it was only restoring a Moorish institution of far older date. It is struck by no ordinary clock machinery, as one would expect, but simply by one member of the family, who lives in the tower, being always on guard, and having a watch to guide him when to pull the rope. This contrivance may be taken as characteristic of the irrigation of Granada. It is constant and assiduous enough, but its machinery is as simple as that of the bell, and dates from a period as remote."—[p. 118.

The district irrigated is from 45,000 to 50,000 acres in area, and this is served with waters by twelve to fifteen canals and a great number of smaller ditches. Water-rights to these date from the earliest times of recorded knowledge of the subject; but the first regulation or code of titles and rules bears date in the early part of the sixteenth century, soon after the expulsion of the Moors. At a somewhat later date, a book of titles to the water was compiled by royal order, and that remains as the authority on such matters to this day. "This work consists of a voluminous manuscript, taking up each canal separately, and stating the size of its headgate, and the quantity of water to which each is entitled." But it does not lay down any system of administration and government, pre-

scribing how these rights are to be exercised and observed. Such a system was attempted, however, at a still later date in a royal order, but this code has almost entirely fallen into disuse.

Of the system of irrigation in 1868, Moncrieff wrote:

"As far as I could learn, the system of the canals is for every little community of irrigators to elect yearly a manager and four deputies, who form a tribunal and settle all minor matters. The manager also goes periodically to Granada, and forms one of the council of sixty, headed by the two lesser *alcaldes* of the city, and presided over by the chief municipal authority, the *alcalde corregidor*, or lord mayor. Each of these local managers has a treasure chest, from which he pays out all the current expenses for the year for repairs, salaries, etc.; and at the year's end he presents his accounts to the tribunal, who pass them and replenish the treasury to the extent of the amount taken out, by a water-rate on the irrigators, which generally varies from thirty to eighty cents an acre. And so by the help of the code of laws—some of them obsolete, many of them not enforced—by a strong traditional custom, and above all an abundance of water, irrigation goes on regularly and without confusion."—[p. 122.

Something more will be said of this system and its results, in chapter XXI, under the heading, "Early Irrigation Associations in Spain."

NOTE TO CHAPTER XVIII.

The note following chapter XVII applies also to this chapter.

AUTHORITIES FOR CHAPTER XVIII.

Aymard.—[Work cited as an authority for Chapter XVII.] See, Chapters VIII, XVI, XVII, XVIII, and XXI, as specifically cited.

Llaurado.—[Work cited as an authority for Chapter XVII.] See, pp. 548–575, 581–584, and 487–497.

Moncrieff.—[Work cited as an authority for Chapter VII.] See, Chapter VIII.

CHAPTER XIX.—SPAIN[4];

THE NEW GENERAL WATER LAWS—RIGHT OF PROPERTY IN AND CONTROL OF WATER-COURSES AND WATER SOURCES.

SECTION I.—*Modern Spanish Water Laws and Regulations.*
The Present Laws and Constitution.
Legislation prior to 1866.
General Law of 1866, and others to 1879.
General Law of 1879, and others to 1884.

SECTION II.—*Ownership of and Rights to Waters and Water-Courses.*
Right of Property in Waters and Water-Courses.
Rights of Water-Source Owners.
The Riparian Water Privilege.

SECTION III.—*Acquired Rights to the Use and Control of Waters.*
Private Appropriation of Public Waters.
Development of Subterranean Waters.
Water-Right Concessions.
Authorizations—Applications.
Protection of Prior Rights.

SECTION I.

MODERN SPANISH WATER LAWS AND REGULATIONS.

Development of the Present Laws.

In chapter XVI something has been shown of the development of the old general laws of Spain, of their arrangement as the *Novisima Recopilacion*—the latest official general codification—and of a subsequent compilation with annotations, in the form of a dictionary of jurisprudence, by Escriche—a writer of authority—before the middle of this century. At the period to which that chapter referred, the general laws of waters were notably fragmentary and without system—the outcome of decrees, customs, edicts, and decisions scattered through centuries and under different governments, forms of government, and conditions, political,

social, and physical. But they had been compiled and commented upon by law writers, had thus assumed something the appearance of order, and in this better form, having been recognized and referred to by courts and executives, came to be regarded as authority. Furthermore, the general laws were not only imperfect, but were frequently set aside by local customs and special enactments, themselves conflicting.

In chapters XVII and XVIII the administrative condition of the principal old irrigation regions where were in force special regulations, founded on ancient rights and local customs, has been sketched; and the confusion which formerly existed, with the results of some remodelings of later dates, under the different fundamental principles locally prevailing, has been shown. Much that was good of the outcome of long practice had, at the period to which these accounts apply, been formally recognized by the Spanish government and embodied in new and systematized ordinances for certain great irrigation regions or districts; but the general laws of Spain with respect to waters, water-courses, and irrigation were still without system and far from complete.

The present chapter and the two following, will be devoted to the now existing general laws relating to waters and water-courses, and to an account of some circumstances attendant upon their development. We will find that much of the inadequacy, uncertainty, and confusion of the old laws and customs have been done away with by excellent general laws and regulations. Spain today possesses the most complete and concise water law system of any country in the world, where irrigation is largely practiced. She was slow in making a decisive step to this end, but when the move came it was apparently well considered, and was certainly well made. She studied her own errors and the successful issues of custom and past legislation, doubtless examined the irrigation legislative doings of, and results of administrative practice in other countries, and then framed and promulgated a general law of waters, covering the whole ground, in its declarations of rights and principles and leading rules of governance, and directing that regulations should be framed and promulgated for guidance in the details of its application and observance.

This action placed Spain in advance of either France or Italy in the simplicity and fullness of general water laws, for neither of these countries, as we have seen, has a concise system of legis-

lation in plain terms, devoted to this one subject, but the governance of their waters and water-courses is subjected to laws, regulations, and the interpretations thereof, scattered through civil codes, penal codes, special laws and regulations, and decisions of courts and administrative authorities, without number. Italy, since the consolidation of its government and the promulgation of its civil code, is much in advance of France in the matter of systemization of water laws; but, even so, their principal provisions are scattered through a code whose arrangement must necessarily render them incomplete and lacking in unity as a water law system, and consequently we find that she has since passed a number of laws supplementing the code provisions with respect to waters and irrigation. Now, Spain had the results of this experience before her, doubtless, when she framed her last general law of waters, and the condition of the country and the laws in general were such that she could not bring a complete civil code out of the chaos, so she attacked the water law problem by itself, and produced a good result.

This was the work of a very few years ago, but the developments which immediately led up to it commenced back in the early part of the century; for the evolution of the present water laws of Spain has been an accompaniment of the rise and establishment of her constitutional form of government; and now, in order that we may readily view the governing political conditions surrounding the steps towards the present law, I briefly sketch in outline some important points in the history, from the promulgation of the first Spanish constitution.

Development of the Present Constitution.[1]

The government of Spain is a constitutional monarchy, but its apparent stability as such is of but very recent dating. Constitutional principles were advanced and crystallized into a constitution in 1812, and Ferdinand swore to support it, but one of his first acts was to overthrow the instrument and imprison and banish its supporters. It was revived in 1820, but only to be again stricken down and replaced by autocracy more complete.

At the death of Ferdinand in 1833, his widow, Maria Christina, grasped the reins of government in the interest of her infant daughter, Isabella. To make friends as against the king's brother, Don

[1] See, Wallis, Chap. V; also, Johnson's Encyclop.: Article, "Spain."

Carlos, the representative of the party opposed to all reform, the regent Christina courted the support of the constitutionalists, and promulgated a sort of constitution in 1834. But this did not satisfy the liberals; so in 1836 the constitution of 1812 was readopted. The constituent cortes immediately framed another fundamental law, which was promulgated in 1837. The civil war ended in 1839, and with it, for the time, the pretensions of Don Carlos. Christina, after a popular outbreak, fled the country in 1840, and renounced the regency. Espartero, a just and enlightened man, succeeded her as regent, and the progressive constitutionalists were in full ascendancy. In the summer of 1843, the moderate constitutionalists came into power, Espartero was forced to fly, the cortes declared the young child, Isabella, to be of age, and acknowledged her as queen. Then commenced the predominant influence of Narvaez, Duke of Valencia, who from that time to the abdication of Isabella in 1868 was a ruling spirit in Spain, and, as we shall see, has done much for irrigation interests.

Under the ministry of Narvaez and the ascendency of the *Moderado* party another constitution was adopted in 1845. But this was sometimes ignored. A revolution followed. In 1868 Isabella left Spain for France. A new and liberal impulse swept over the country after her departure. The cortes adopted a new constitution in 1869, a monarchy with responsible ministers was in the same year proclaimed, Serrano was made regent, and universal suffrage was for Spain an accomplished fact. The following year, after much negotiation, Prince Amadeus of Savoy was elected king by the cortes. In 1873 great confusion prevailed, a Carlist insurrection was raging, and Amadeus abdicated and left the country. The cortes immediately proclaimed a republic, and, for a year, this form of government prevailed in the middle and south of Spain, while the monarchists under Don Carlos held possession in the north. Early in 1874 the republic was set aside to reëstablish the government under the constitution of 1869, and Serrano was again made regent.

At about the end of the year, Alfonso, son of Isabella, was proclaimed king. A constitutional government with a responsible ministry was revived upon his taking the reins of rule in 1875, a revised and advanced constitution was adopted in 1876, and continued to the time of his death in 1885.

As we shall see in a future chapter, certain extended irrigation works had been constructed, and several important moves had been made in the last century, in the way of governmental encouragement of irrigation enterprise, and the construction of great national canals of irrigation and other acts of advancement in the field of this subject was continued in the early part of this century, during the despotic rule of Ferdinand, but it was not until after the partial accession of the constitutional party to power under Isabella, and the promulgation of the constitution of 1845, that the laws and series of royal orders were promulgated that led to the general water law of 1866—the foundation of the present system—to which attention is now asked.

Legislation Prior to 1866.[1]

The following named laws and royal orders are the chiefest of those which were promulgated concerning waters, water-courses, and irrigations during the reign of Isabella and the ascendancy of the moderate constitutional party:

Royal order of March 14, 1846, to which the useful employment of the waters of rivers must be subjected.

Royal order of August 21, 1849, reaffirming and publishing anew the substance of the foregoing order concerning water utilizations.

Royal order of December 4, 1859, concerning the useful employment of public waters, prescribing conditions of authorizations therefor.

Royal order of April 6, 1848, ordering that the political governors of the provinces shall return the originals of papers concerning water utilizations.

Royal decree of October 27, 1848, declaring the continued existence, notwithstanding the provisions of the penal code, of the special irrigation courts of Valencia, Murcia, and elsewhere, and defining the extent and character of their powers and duties.

Royal order of March 15, 1849, defining more at length and in detail the status and duties of special irrigation courts.

Law of June 24, 1849, exempting the capital newly invested in irrigation works, from taxation for ten years after completion of construction, and also declaring, establishing, and providing for the enforcement of the servitude of aqueduct, or right-of-way for waters for private or individual irrigations.

[1] See, Pardo, *Legislacion de Aguas;* also, *Memoria sobre las Obras Publicas.*

Royal order of twenty-ninth of November, 1850, concerning the execution of that part of the former law relating to exemption of new irrigation works from taxes.

Royal order of second of September, 1852, establishing rules for conducting examinations preliminary to the granting of concessions of water privileges.

Ministerial instruction of the twentieth December, 1852, concerning the application of that part of the law of 1849 which specially related to the servitude of aqueduct.

Royal order of February 13, 1854, ordering that applications for water privileges shall be accompanied by all the documents concerning the project, in duplicate, in each case.

Circular of the direction-general of February 21, 1859, prohibiting any departure from plans of projects already approved, without due authorization.

Royal order of March 11, 1859, concerning duties of engineers connected with projects for utilizing waters.

Royal order of April 5, 1859, concerning examinations preliminary to the granting of water privileges, and the duties of engineers in the same connection.

Royal decree of April 20, 1860, dictating rules for carrying to completion enterprises which have for their object the useful employment of waters. A lengthy and important order.

Royal order of February 28, 1861, declaring provincial authorization to be sufficient for the execution of works of repairs or reconstruction of old dams in the rivers.

Ministerial circular of December 18, 1865, dictating rules to be observed in issuing authorizations for the employment of public waters.

Law of the eleventh of July, 1865, relative to the disposition of 100,000,000 *reals* for the encouragement of irrigation.

Royal order of July 29, 1865, naming ten hydrological divisions, to systemize the study of the water supply of Spain.

Royal order of January 14, 1866, providing the form in which investigations should be held in the matters of water utilizations.

Ministerial circular of January 14, 1866, concerning administration and judicial powers and duties in the questions of water utilization.

Royal decree of June 4, 1866, authorizing the formation of the *Iberian Irrigation Company, limited.*

General Law of 1866, and others to 1879.[1]

On the third of August, 1866, was promulgated a general law of waters for Spain, embracing all that had found place in the laws and orders just named, and in the old laws heretofore abstracted, and very much which was new to the general laws of the country—having been taken from local laws and customs of some of the irrigation districts, or, possibly, from the laws of Italy or France. The new general law comprised three hundred articles, and would occupy about sixty-three pages of this volume. It has been in its essential features and arrangement reproduced in the present general law of 1879, a translation of which is presented in appendix III hereto. Its framing was the work of a royal commission which for eight years labored to reconcile the incongruities of the general and the clashing of the local laws and customs on the subject. It is a very complete and vigorous work, but in part overloaded with details which in the newer law have been left to administrative regulations.

Following the general water law of 1866 came a law of February 20, 1870, concerning canals and reservoirs of irrigation, regulating the issue of concessions for such works, their construction and management, and authorizing governmental encouragement and aid to enterprises of public importance. It will be noticed in the succeeding chapter on governmental policy.

Interpreting these two laws, establishing regulations for their application in detail, defining the duties, powers, and jurisdictions of administrative officers, courts, etc., there were promulgated from 1866 to 1879, about one hundred and fifty decrees, royal orders, ministerial orders, etc. But these, with the laws to which they chiefly related, have been set aside or embodied in the general law of waters, of 1879, the law of encouragement to irrigation, of 1883, and the decrees, orders, etc., following and relative to them, of which I write under the next subheading.

The General Law of 1879, and others to 1884.[2]

The general law of waters of 1879, of which a complete translation is presented in appendix III, is the present law of Spain on this subject. It is arranged in five titles and fifteen chapters, according to the following outline:

[1] See, Pardo: *Legislacion de Aquas;* also, *Memoria sobre las Obras Publicas.*
[2] See, Bentaból and Ureta, *Novisima Legislacion de Aguas.*

Title I—Of the Dominion of Terrestrial Waters.

Title II—Of Beds, Channels, Banks, Margins, Accretions, and Works.

Title III—Of Servitudes on the Subject of Waters.

Title IV—Of the Useful Employment of Public Waters.

Title V—Of the Administration of Public Waters.

Title I, in four chapters, treats of the ownership and control of (1) rain-waters; (2) living waters, springs, and streams; (3) standing waters, ponds, and lakes; and (4) subterranean waters obtained by ordinary wells, or by artesian wells, shafts, or galleries.

Title II, in three chapters, treats of (1) the beds, or channels, banks, margins, and accretions of water-courses and lakes, or ponds, and of floating and submerged articles of property; (2) works of defense against public waters; and (3) the drying of swamps and marshy lands.

Title III, in two chapters, treats of (1) the natural servitudes of drainage, etc.; and (2) the legal servitudes of right-of-way for water, right-of-abutment for a dam, of drawing water, and of watering places, of towpaths, and others inherent to riparian property.

Title IV, in two chapters, treats of (1) the common utilizations of public waters, such as free use for domestic, agricultural, and manufacturing purposes, for fishing, and for navigation and transportation; and (2) the special utilizations of public waters, such as conceded rights to supply towns, railroads, irrigations, navigation canals, industrial establishments, and fish ponds.

Title V, in four chapters, treats of (1) the police or guarding of public waters; (2) irrigation associations, syndicates, and special courts; (3) the powers and duties of the administration; and (4) the jurisdiction of the ordinary courts, in the matter of waters.

This law contains two hundred and fifty-eight articles as against two hundred and seventy in the corresponding portion of the law of 1866, and relates only to terrestrial waters, while the law of 1866 contained provisions relating, as well, to waters and shores of the sea within the jurisdiction of Spain. The last law is an improvement on the first named, in that it is more concise and pointed, and leaves much matter relating to details of procedure, etc., to be put in the administrative regulations under it.

Since the passage of the act of 1879 down to and inclusive of September, 1884, there has been no change in the law on the sub-

ject of waters or water-courses, and but one law passed relating to irrigation, but there have been issued about 125 decrees, royal orders, ministerial orders, and circulars upon these subjects. The law passed is that of July 27, 1883, authorizing subsidies to be awarded to those who properly carry out irrigation, canal, and reservoir enterprises, and is referred to at length in a succeeding chapter hereof. Of the decrees and orders mentioned, they are classified under thirty-eight headings, and severally relate: nine to the discovery of waters, four to drainage waters, eight to private waters, three to works in river channels, five to projects, five to irrigations, nine to canals and reservoirs of irrigation, thirty-seven to irrigation communities, three to forfeiture of concessions, four to alterations of utilizations, eleven to servitudes, and most of the remainder to matters of administrative and judicial power, duty, and jurisdiction under the general law. These orders and decrees embody regulations for the application of the general law in detail, and many interpretations of the law itself, and other matters relative thereto. They compose a volume of matter which, taken with the law itself and others heretofore spoken of, forms the basis of the present and the following two chapters.

SECTION II.

Ownership and Rights to Waters and Water-Courses.

Of Waters and Water-Courses.

Waters are treated in the law, according to their source and condition, as, (1) fallen waters—those from rains; (2) risen waters—those of springs and other naturally rising sources; (3) running waters—those of streams and rivers; (4) standing waters—those of ponds, lakes, and marshes; (5) subterranean waters—those under the surface of the ground, or caused to rise thence by artificial means or works of development; (6) drainage waters—the output of sewers and drains. Waters flowing directly from the effect of rains are not regarded as flowing waters, even though swelling the volumes of streams. Flowing waters are those which impart a measurably constant volume to a current—the normal flow of streams according to the season. A small stream, as distinguished from rain-waters flowing in a small channel, is one

which is fed by springs or general gathering grounds, and has a flow in dry as well as wet weather, even though it be not continuous the year round.

Right of Property in Waters.[1]

Rain-Waters.—For the purposes of the law, the waters which flow away or collect immediately from rains are regarded as rain-waters. These belong to the owner of the property, whether a private individual, the state, a municipality, or a province, upon which they fall and while they run through it; but so soon as they flow beyond such property, into a channel wherein other waters flow, they become public—a part of the public domain.

The owner of a property, whether a private individual, a municipal or other body, may freely construct within his lands, any work for the storage, conservation, or utilization of the rain-waters which fall on such property. Rain-waters which fall on the public domain or on municipal lands, are controlled by the municipality within whose jurisdiction the lands are, but an appeal may be taken to the governor of the province in matters pertaining to them.—[Articles 1–3.

Springs and Sources.—As waters which fall on the surface of a private or other property belong to the owner thereof, so those which rise to the surface, from substrata, within such estate are the property of its owner just as much as the estate itself. It matters not whether the spring or rising water is continuous or intermittent in its flow, so long as the owner usefully employs the water and does not, by his neglect, suffer others to acquire a right to its use by their employment of it, he owns it in complete propertyship while it flows through his lands.—[Articles 4 and 5.

Rivers and Streams.—All running waters, except those on the private lands of their rising or falling, are public. Article 4 of the law of 1879 is as follows:

"There are public, or of the public domain:

* * * * * * * *

"*Second*—The waters of continuous or intermittent springs and small streams which flow in their natural channels.

"*Third*—The rivers."

[1] See, Bentaból and Ureta, *Novisima Legislacion de Aguas.*

The articles herein cited by number are those of the general water law of 1879, as found in the above named work and translated for appendix III, hereto. All other orders, circulars, etc., referred to, are found in the work named.

Thus, waters of springs and small streams, whether in beds on and of private property or not, are public waters if flowing in natural channels not on the private lands where they have fallen or risen, and the waters of rivers are always public.

The law is silent on the point of the ownership of such waters when diverted into artificial channels, but subsequent administrative rulings declare that public waters become private property only when used, and are not private property when simply turned into a private channel.

Dead and Stagnant Waters.—Having treated of fallen waters, risen waters, and running waters, the law thus speaks of standing waters:

"Lakes and marshes formed by nature and covering public lands are of the public domain. Lakes, marshes, and ponds formed on the lands of their respective estates, belong to private individuals, to the municipalities, to the provinces, and to the State. Those situated on lands of common profit belong to the respective towns."—[Art. 17.

Subterranean Waters.—Waters in strata or streams beneath the surface of the ground, belong to the owner of the ground when he shall have secured them for use, but before development, they are of that class of things which belong to no one in particular, and, consequently, to the public.

Town Drainage Waters.—Sewage, or town drainage waters, belong to the town or municipality where formed or collected, and are under its full control; but this may be lost, as will be seen under the next subheading.—[Art. 13.

Ownership of Water Channels.[1]

Rain-water Channels.—The natural bed or channel of an intermittent stream formed by rain-waters, is the land which these cover during their ordinary floods in the deep or shallow washes through which they pass. These channels belong to the owner of the property in which they are situated. Each town and pueblo controls them, within the region of its municipal jurisdiction, when on public, provincial, or municipal lands, and may issue permits for constructions therein. Private ownership of such channels does not justify the making of works or plantations in them, such

[1] See note to the preceding subheading.

as might change the course of the waters to the injury of other parties, or whose destruction might result in injury to other works or structures below.—[Articles 3, 28–31.

Small Stream Channels.—The natural bed or channel of a small stream, is the land which its waters cover in their greatest ordinary floods. The beds of small streams belong to the owners of the cultivated grounds or lands through which they course, and hence are public or private as the lands happen to be in public or private ownership. The municipalities, provinces, or even the state may exercise control over the public channels of small streams, and in a measure, as will be seen hereafter, those in private ownership as well, are subject to administrative supervision. The private ownership of small stream beds is subjected to the restrictions already spoken of as imposed upon the ownership of rain-water channels.—[Articles 32, 33.

River Channels.—The natural channel of a river is the land which its waters cover in the greatest ordinary floods. This includes the bed and the banks; the latter being the borders of the channels included between the plane or edge of the lowest waters and that of the floods. The lands contiguous to the banks of a river are termed its margins. The beds of all rivers belong to the public domain. The banks of all rivers, except in local cases where ancient law, custom, or special title has arranged to the contrary, also form part of the public domain. In all cases the banks of rivers and the margins to a certain extent are subject to public use for convenience of navigation and fishing.—[Articles 32–36.

The use of a bed of a river will not be conceded for any purpose that may interfere with the flow of its waters in the smallest damaging degree; nor will any part of a river bed on public territory be sold; nor yet will public lands be sold bordering a river, until the channel shall have been surveyed and determined upon.[1]

Lakes, Marshes, and Ponds.—The bed or bottom of lakes, marshes, or ponds, is the land which the waters occupy at their greatest ordinary height. These may be the property of the state, of a province, or of a municipality, or, by special title, of a private individual or grantee, without respect to the ownership of the ad-

[1] Royal Orders, August 4, 1879, April 3, 1880, and August 16, 1880.

jacent or bordering properties. When not thus separately held, they belong to the owners of the contiguous lands. The beds of all navigable lakes belong to the public, and even when in private ownership their shores are subject to public use, within certain limits, for purposes of navigation, etc.—[Articles 37–39.

Rights of Water-Source Owners.[1]

The ownership of a water-source gives the proprietor most absolute control over its waters. He may use them at will upon his property, as abundantly and for whatever purpose he chooses, provided that he does not thereby injure others, and that he does not interfere with acquired uses of the waters below. As such rights can be obtained, against his desired or sufficient utilization, only through his negligence, permission, or formal grant, he is primarily in absolute dominion of his waters. By the passage of the law of 1866, the owners of water-sources were given twenty years in which to utilize their waters, after which, it was declared these should be subject to use by riparian owners below, and that they could acquire a right to them by one year's utilization. Article 11 of the law of 1879 is as follows:

"If, after twenty years, counting from the day of the promulgation of the law of 1866, the owner of a property where waters rise naturally should not have used them, wasting them wholly or partially in any manner whatever, he shall lose all right to interrupt those using or applying the same waters lower down, who for the period of a year and a day consecutively may have used them."

At all times the surplus over and above the amount of his employment, and the drainage or residue from his utilizations, is subject to use below, as against any claim of right by a source owner, but when he has used any fixed or known quantity of water, it being only part of the normal flow of the same, in seasons of scarcity or drought, he may use all, up to his full amount required, and the loss will be that of the utilizers below.—[Art. 10.] Waters not used and waters draining off from irrigations on the property of a water-source must be turned into their natural channel at its point of departure from the estate, unless these can be conducted to it or utilized on riparian lands below, by the route of the canals or ditches in which they run.—[Art. 9.

[1] See note to the preceding subheading.

The following is the syllabus of a very recent administrative decision on the foregoing points:

"The law does not establish any limit to the utilization of private waters by the proprietor, for on him it imposes no other obligation than that of permitting the waters which he does not use to flow directly through their natural and accustomed channel, according to the tenor of article 9 of the law in force."[1]

Before the expiration of the twenty years from the passage of the law of 1866, the owner of a water-source can claim his right to the waters, unless these have been utilized by riparian proprietors below for a period of twenty years.—[Art. 8.] But although the owner of a water-source may lose his right to consume the waters in irrigation or otherwise, he always retains a right to employ them, without appreciable waste, in the movement of machinery. —[Art. 14.

The Riparian Water Privilege.[2]

As we have now seen, with the exception of waters which fall as rain on a private property, rise as from a spring on such property, rest as in a lake or pond on such property, or are artificially brought to the surface as by an artesian well, or stored in a reservoir, are public waters. Even rain-waters, when they have run off from the private tract where they have fallen, and the waters of springs escaping from the land of their rising, immediately become public; so that the waters of all rivers and small streams in their natural channels, whether on private property or not, and of all springs and rains flowing in such natural channels, provided these are not on the tract of their rising or falling, are public waters: in other words, under the Spanish law, there can be no such thing as a private stream flowing from one property to another, and so on through others, nor even flowing on the bounding line between two properties.

The bed of such a stream may belong to the owners of the bank lands, but its waters and the stream as a whole, are public, and the riparian proprietors have no right of control over them. There is no such thing as a riparian right to a stream—to have its waters undiminished in quantity, or even to have them flow at all, because of a right to the stream—and a lower riparian proprietor has absolutely no rights as against the necessities of those higher on

[1] Royal Order, January 5, 1883.
[2] See note to the preceding subheading.

the stream, unless he has acquired, by an useful employment of the waters, a priority of privilege, and subject also to certain classifications of estates and of water utilizations which fix an order of preference in each line.

But, under Spanish laws, although there is no riparian right of control over streams, riparian proprietors have, subject to the rights of owners of water sources, certain preferred privileges to utilize the waters of water-courses. Let us see exactly what these privileges are.

The Waters of Springs and Small Streams.—After having passed out of the property where they rise, the waters of springs and small streams which enter naturally to run through or contiguous to other properties in private ownership, either before coming to public channels or after having run through such, become subject to a riparian right of use. The riparian proprietors may, each in his turn, acquire a definite right to usefully employ them.—[Article 5.] An order of preference for thus profiting by riparian ownership is established by the law: *First*, the properties through which the waters flow—that is, those properties in one tract and ownership on both banks—have, successively, in the order of their situation from the head of the stream, the option to take and use the waters necessary for their irrigation; and, *Second*, the properties fronting on or contiguous to the channel, in their order and turn, commencing again at the one highest on the stream, have the option to make good a right by using the waters in irrigation. —[Article 7.

The right is not, however, with any of these properties, a continuous one; it is simply a first, second, or third, etc., as the case may be, choice, or option, to take and utilize the waters, and must be availed of within a year, else it may be forestalled by greater promptness in use by some lower proprietor; for the law says:

"It is understood that those lower and bordering properties which shall have anticipated the utilization by a year and a day, cannot be deprived of it by another, although it may be found situated higher up on the course of the water; and that no casual employment can interrupt or attack rights previously acquired over the same waters in a lower district."—[Articles 7 and 10.

The law makes quite a distinction in its wording between the privilege which it extends and the right which may be acquired by a proper availing of that privilege. For, whereas, the priv-

ilege is one of fortuitous or casual use, which must be kept constantly alive by compliance with terms of law, and may be "strengthened by uninterrupted use," "the right to usefully employ indefinitely the waters of springs and streams is acquired by the owners of lower lands, and, in their order, of those contiguous to the channel, when they utilize them without interruption for the term of twenty years."—[Articles 5, 8, and 10.

Thus, we observe that this riparian water privilege is not a continuous servitude inherent to all bank lands alike, but it is a preferred privilege of riparian land owners, to make good a claim to waters, graded through in the order of situation of the properties. It is an option to acquire a right to waters, conferred by law on owners of riparian lands, and not a natural water-right inherent to riparian property. The right to water to be had under it is an *acquired* right and not a *natural* right: it is not a riparian right as known to either the French civil law or the English common law.

There is no limit of amount placed on those who have the priority of choice, except the limit of economical employment of the waters, and that referred to in article 6 and hereafter to be spoken of; but there is the limitation in time, on the privilege of choice, to one year. Taking, for instance, a stream upon which no waters have been utilized, upper proprietors, in the order already explained, would have priority of privilege to construct works and divert waters in irrigation. As against those below in the scale of privilege, any one of these might, if his land demanded the water, and if not restrained by the administration, use it all in irrigation; but if he should neglect to make good his privilege by economical use, and should permit some other below him to usefully employ the water for a year and a day, then this employer cannot be disturbed in his use of it, so long as he continues to make the useful application.

But as a condition to this apparent freedom of taking comes a restriction on the construction of works and on the diversion of waters when the amount to be derived exceeds a certain very small limit. Article 6 says: "Every casual employment of the waters of springs and small streams in natural channels may be fully effected by means of works by the owners of property situated lower down, always provided that they do not make use of barriers other than of earth and loose stone, and that the quantity of water consumed by each one of them does not exceed ten litres (0.353 cub. ft.) per second of time." Now, this amount of water is

very small; it would be carried in a stream 1 foot wide and 4½ inches deep, flowing at an average rate of one foot per second—a mere little trough of water, such as is used in the irrigation of a garden patch.

Let us see what is the alternative. We find it in article 147, which says:

"An authorization is necessary for the useful employment of public waters nominally intended for undertakings of public or private interest, excepting the cases clearly expressed in articles 6, 174, 176, 177, and 184 of the present law."

Now, we will see that the last named articles do not apply at all to the case of waters of small streams and springs, which we are at present considering, and to which article 6 relates; and thus we have, as a result, this conclusion: Notwithstanding the privilege or option to utilize the waters of springs and small streams, which articles 5, 6, 7, and 10 refer to and confer on the bank-land owners, wherever one of these has to construct in a stream a work other than a barrier or dam of earth or loose stone, or desires to divert more water than 0.353 cubic foot per second, he must obtain a special authorization from the competent governmental authority.

Article 33 is explicit on the first part of this point. Taken in connection with article 31, which it refers to as part of itself, it says:

"The beds of small streams belong to the owners of the cultivated grounds and of the lands which they cross," but "the private ownership of the beds does not authorize cultivations to be made in them nor works to be constructed, which would change the natural course of the waters, to the injury of other parties, or whose destruction by the force of floods might cause damage to landed properties, factories or establishments, bridges, roads, or towns situated lower down."

The extent of the unrestricted privilege of the most favored riparian proprietor upon a small stream, below the tract of the water-source, therefore, is to divert and use a little more than one third of a cubic foot per second, and to construct, for the purpose, in the channel, a dam or barrier of earth or loose stone, which would be carried out by the first freshet, and in no way would affect the flood régime of the stream. Going beyond this, he must obtain permission from the administration. Here comes in the principle of governmental control and authorization, more

fully treated of under a subsequent heading; but with respect to the practice as applied to proprietors on small streams, it is well to close the subject here.

Should a riparian proprietor on a small stream, having, by reason of the situation of his property, under article 7, a priority of privilege to casually employ the waters, desire to use, for instance, the whole stream in irrigating his land, and apply to the administrative authorities for permission to construct works and divert waters beyond those allowed by article 6, the authorities, after publication and other notification, would hold an investigation or inquiry, at which all proprietors situated below would be expected to hear the application and make their objections. If there appeared no proof of prior utilizations, and no sufficient evidence of intention on the part of lower proprietors to utilize waters, to the extent of the right conferred by article 6, within a year, the administration would allow the applicant to divert all the waters of the stream for his irrigations, saving the limitations explained in the two following paragraphs.

Speaking of concessions of privileges to use waters of streams, article 160, after establishing a scale of preference as between town supplies, railroads, irrigations, navigation canals, mills and factories, etc., says: "In every case, the common employments of water clearly expressed in sections one, two, and three of the former chapter will be preëminently respected." Now these common utilizations come under the following section headings, namely: (1) The employment of public waters for domestic, agricultural, and manufacturing purposes; (2) the occupation of public waters for fishing; (3) the utilization of public waters for navigation and flotation. More definitely, these employments are the following. Article 126 says: "While waters run through their natural and public channels, all may use them for drinking, washing clothes, vessels, and any other objects, for bathing, and watering or washing horses or cattle, subject to municipal police rules and regulations."[1] Article 129 reads: "All may fish in the public channels, subject to the law and police regulations," etc. Article 138 is: "The navigation of rivers is entirely free," etc.

Hence, when waters are used for drinking, washing clothes,

[1] The "agricultural" use, other than those above named, classed under this heading, is the watering of isolated plants, with water taken from canals or other aqueducts, in a bucket or other vessel, and is not *irrigation*, which latter is ranked as a *special* utilization and not a *common* employment of water.—[See, Article 127; also, the following section and the articles therein referred to.

vessels, etc., for bathing, and watering or washing horses or cattle, when they are essential to fishing, navigation, or flotation at lower points, new concessions of them for irrigation will not be issued by the authorities, even not to a preferred riparian proprietor. But should there be a surplus in a stream over and above the amount required for the common utilizations above enumerated, the administration will grant the right for its employment in irrigation, up to any amount that may be necessary, on the riparian property which first in its order applies for it; subject to the privilege which each has to take within a year, without authorization, an amount equivalent to about the third of a cubic foot per second.

The Riparian Water Privilege—(Continued).

Rain-Waters in Natural Channels.—Rain-waters are defined in article 1 as those "which proceed directly from rains." They are those which run off as floods or freshets by and through channels of all descriptions, their flow terminating, except in larger rivers, within a very few days after the rainfall ceases. The owners of properties, bordering on channels of intermittent flow through which rain-waters course, have the privilege to utilize them in irrigation, under the following provisions of the law:

"Article 176. The owners of properties contiguous to the public roads can collect the rain-waters which run through them, and employ these for the irrigation of their fields, in subjection to that which the ordinances direct for the preservation and police of the said roads.

"Article 177. The owners of property bordering on channels of intermittent flow, as shallow washes, small streams, ravines, or others similar of the public domain, can employ in their irrigation the rain-waters which run through them, and construct for the purpose, without the necessity of authorization, dikes of earth and loose stone or dams either automatic or movable.

"Article 178. When these dikes or dams may produce inundations, or cause any other injury to the public, the *alcalde*, officially, or at the request of others, the danger being proved, will order that those who constructed them shall modify them as much as may be necessary to remove all fear, or, should it be necessary, that they destroy them. If they threaten to cause injury to private persons, the latter may appeal at once to the local authority; and if the injury is realized, they shall have their rights examined into promptly before courts of justice.

"Article 180. The provisions of the preceding articles, relating to rain-waters, is applicable to intermittent springs, which flow only in times of abundant rains."

We here find a very much restricted privilege. In the first place, only the rain-waters, and those of intermittent springs, which run along public roads or in small channels of intermittent flow, are subject to utilization by the owners of adjoining property. Rain-waters in any stream which flows a considerable part of the year without stopping, are not subject to such use without special authorization. The restriction on the liberty of maintaining works, even in such channels as rain-waters may be freely diverted from, is a decided one, and such as to prompt any one contemplating the construction of a permanent work for the purpose, to secure an authorization for it. Thus, even for the diversion of rain-waters from streams of intermittent flow, by a permanent work, an authorization is necessary to secure the builder a well grounded right to maintain his work. Indeed, article 181 is explicit on this point, in the following words: "When it is designed to construct dams, or weirs, of a permanent character, in order to employ for irrigation the rain-waters, or the intermittent springs which run through public channels, the authorization of the governor of the province will be necessary, after due formality."

As to the term during which it is necessary to use rain-waters in order to prevent others above from taking them, we find article 179 in point, as follows: "Those who during twenty years should have employed for the irrigation of their lands the rain-waters which flow through a shallow wash, ravine, or other similar channel of the public domain, can object to the owners of properties higher up depriving them of this advantage. But if they should have employed only a part of the water, they cannot prevent others from using the remainder, provided that the flow for the quantity which they have for a long time employed remains free."

In contrast with most other provisions of this law, the above article is very ambiguous. It would appear that use for a year and a day, and continued use thereafter, is not, as it is in cases of use of waters of perennial streams, sufficient to prevent others above from taking the rain-water supply used by a lower riparian proprietor, but that the use must be for twenty years. And it would also appear that use "for a long time" is sufficient to prevent interference by superior proprietors, when a part only of the waters have been employed.

The Riparian Water Privilege—(Continued).

The Waters of Navigable Rivers.—The extent of the riparian privilege to divert or take waters from a navigable stream is set forth in article 184, to the effect that the proprietors of bank lands may freely establish pumps, or any other machine intended to draw waters necessary for the irrigation of their bordering properties, provided that they do not cause injuries to navigation and that they do not use steam as a motive power. These conditions being violated, or their violation contemplated, an official authorization is necessary.

SECTION III.

Acquired Rights to the Use and Control of Waters.

Private Appropriation of Public Waters.[1]

Having considered the subject of the riparian water privilege, we are now to examine the Spanish law, to see what right of appropriation of public waters it extends to all landholders and the public generally, and what privileges of utilization these can acquire by governmental concession. Title IV treats of the useful employment of public waters, and under this general heading are two chapters, namely: X, "Of common utilizations of public waters," and XI, "Of special utilizations of public waters." As we have already seen, article 160 accords precedence in every case to the common utilizations of waters: these being for drinking, washing clothes, vessels, and any other objects, bathing and watering horses and cattle, fishing, navigation, and flotation. Articles 126, 129, and 138 say that while waters run in their natural and public channels all persons may use them for these purposes, subject to municipal police rules. This is an authorization of appropriation for these purposes, and where such appropriation or necessity exists the administration prevents any diversion above, which will interfere therewith.

As we have seen, article 6 accords, and articles 5, 7, and 10 refer to the privilege of taking accorded to riparian proprietors on small streams, article 174 authorizes railways to take water which

[1] See note to first subhead of preceding section.

is attached to lands condemned or purchased by them, articles 176 and 177 relate to the taking of rain-waters by riparian proprietors, and article 184 accords a limited privilege of water utilization to the owners of bank lands on navigable rivers. Referring to these cases, as the only exceptions, article 147 says that "an authorization is necessary for the useful employment of public waters, nominally intended for undertakings of public or private interest." With the exception, therefore, of the privileges referring to common utilizations, there is no right of appropriation of public waters, whatever, accorded to the public by the present Spanish law.

The wording of the law itself appears to have been most carefully made to convey an exact meaning on this point. There are four verbs employed, in speaking of the taking of waters under the provisions of the law, and of the rights acquired thereby, as follows: *aprovechar*, to apply to a useful purpose, to profit by, to usefully employ; *utilizar*, to utilize; *usar*, to use; and *apropiar*, to appropriate. *Usar* or its derivations appears frequently, *utilizar* quite frequently, and *aprovechar* is employed the greater number of times; while *apropiar* finds place but twice in the entire law, namely, once in article 23 where the owner of land is given authority to search for and "appropriate," by means of artesian wells, etc., the waters which may be in the ground under his property; and once in article 86, in speaking of waters which might be absorbed from lands by constructing a new canal through the property.

Under this Spanish law, then, a land owner may "appropriate" "artificial" or "discovered" waters, or those which he has discovered and brought to the surface of the ground by artificial works, and he is prohibited from constructing a canal through another's property so as to drain the waters out of it which are already "appropriated"—that is, actually made part of the property—by the owner of the land, but he is nowhere given authority to "appropriate" public waters, either with or without an authorization. He may "usefully employ," "use," or "utilize" these, under the law; and when he takes them without a special permit, the purpose of the taking must come under the heading of a "common utilization," and be made in a bucket or other vessel, or else he must be a riparian proprietor and take to the very limited amount, or by the circumscribed means elsewhere mentioned; and however he takes without special permit, the object must be in good faith

for use on his own land, or by himself or family, or in his own individual occupation, and not for sale, distribution, or rental.

The noun used is uniformly *aprovechamiento*, an "useful employment," derived from *aprovechar*, and not from *apropiar*, to appropriate. "An appropriation" of waters is not mentioned in the present general law, or in any other which has been examined.

The difference is in this, namely: that a mere *taking* of waters does not constitute an act conferring or bettering a right, under the Spanish law; and the privilege of taking waters is accorded only in the restricted number of cases, for the purposes, and in the limited amounts, referred to and explained above, and under the preceding subheading. As will be seen under the following headlines, even where authorizations are issued, the privilege is not for a taking of water, but a defined *useful employment* of it, with restrictions of a stringent character, and under pain of forfeiture if these be not complied with.

Development of Subterranean Waters.[1]

Ordinary Well Waters.—There is no declaration in the Spanish general water law to the effect that waters beneath the surface of lands primarily belong to the property owner. On the contrary, the subject of subterranean waters is treated apparently upon the principle that waters thus situated belong to no one until developed—or a right to them is *acquired*. Thus, article 18 says: "Subterranean waters belong to the owner of a property in full proprietorship, who shall have obtained them on it, by means of ordinary wells." And article 19 continues: "All proprietors may freely open ordinary wells to raise water within their own properties, though a diminution of the waters of their neighbors result from them." True, this last article concludes by saying that "a distance of two metres between well and well within the towns must be preserved, and fifteen metres in the country." But this restriction is a mere police measure, designed to regulate the private drawing upon a property which, belonging to no one, is the ward of the nation. The water becomes the property of the land owner only when it stands in the well he has excavated. In other words, he does not own it primarily because of its being under, and thus part of his property, but he *acquires* a right to so much as he obtains by his work of development. The ordinary wells

[1] See note to first subhead of preceding section.

which the property owner may thus freely sink, are defined in the law as "those which are opened with the exclusive object of accommodating domestic use or the ordinary necessities of life, and those which in the extraction of the water do not employ on the apparatus any other motor than manual labor." It would appear from this that all others came under the head of draw wells or of artesian wells, which are next written of.

Further than this, article 21 treats of the development of subsurface waters on public lands, as follows: "The authorization to open ordinary wells or draw-wells, on public lands, shall be granted by the administrative authority, in whose charge is found the management and police of the land. He who shall obtain it, shall acquire full ownership of the waters he may find." We notice here that the authorization is for the opening of the well, and the right is acquired by the finding of the water, independent of any right to lands over it. The ordinary wells spoken of in this paragraph are the same as those referred to in that preceding, and the draw-wells are ordinary wells whence water is drawn by power machinery.

Artesian Waters.—There is more restraint placed upon liberty of development of artesian waters than on that of subsoil waters by ordinary wells, as the following article shows:

"The owner of any land may search for and fully appropriate by means of artesian wells, or by shafts or galleries, the waters which exist under the surface of his property, provided he does not divert or remove public or private waters from their natural course. When, in consequence of an artesian well, shaft, or gallery, a result is threatened which will divert or diminish the public or private waters due to a public service, or to a preëxisting private employment by rights legitimately acquired, the mayor, officially, on the motion of the municipal council in the first case, or by means of information from those interested, in the second case, can suspend the works. The decision of the mayor shall be final, if not opposed within the legal term before the governor of the province, who shall then dictate the decision that goes out, previously hearing those interested, and statements and opinions of experts."—[Article 23.

We observe here that, whereas, in the case of ordinary wells the police clause of the law requires only certain distances to be observed between well and well, and disregards consequences to the water supply of others, similarly obtained, in this case of artesian wells, shafts, and galleries, a right can be acquired only to waters

which have not been previously developed or utilized. If, by the construction of an artesian well, shaft, or gallery, the artesian or other water supply which has been properly utilized, by a private individual, association, or public work, is threatened with diminution, the administrative authority will suspend the work. The opening of artesian wells on one's own property, therefore, is not free: by this means the owner of a property may draw on the stock of waters beneath the surface, only in so far as he does not interfere with those who have preceded him. He does not own the waters till he gets them; and he must not take those which other people have acquired a right to.

The owner of lands, however, although he does not own the waters under them, has complete control over them, and no works of exploration can be conducted or authorized upon them, even by the government, without his consent, or unless his property be condemned for purposes of public utility, and paid for according to law.[1]

When a land owner or other person duly authorized does obtain an artesian flow without interference with other rights, natural or acquired, he owns the water of his well. Article 22 is as follows:

"When the development of artesian waters is sought by means of artesian wells, or by shafts or galleries, he who finds them, and causes them to rise to the surface of the earth, shall be the owner of them forever, without losing his right though they run away from the property where they are discovered, whatever may be the direction which the discoverer wishes to give them while he maintains their control."

Thus, unlike the case of waters which rise naturally on a property, the owner of waters caused to rise artificially may lead them off on to another property of his own or may sell them to others for their use.

Notwithstanding this complete ownership of artesian waters, their possessor must utilize them, or cause others so to do, else by his negligence he lose his control of them, for the last quoted article thus continues:

"Should the owner of the discovered waters not construct a channel to conduct them through the lower properties which they might cross, then the owners of these properties shall commence to enjoy the casual rights which are conferred by articles 5 and 10 in relation to natural upper springs, and the final right which

[1] Royal Orders, July 11, 1877, and October 8, 1879.

article 10 establishes, with the limitations fixed in articles 7 and 14."

In other words, the waters become subject to the accorded privilege of riparian proprietors, the same as waters which have not been developed by artificial works, and rights to them may be perfected by utilizing them as already explained in the second section of this chapter. The owner of an artesian well cannot underdrain or draw away the water from another's well, and he cannot retain the control of his water unless he usefully employs it.

But beyond the provision which protects absolutely a developed artesian flow or other utilized supply from being underdrained by newer artesian wells or excavations, we find, also, a clause which limits the distance from others, within which new wells, excavations, or works may be executed. Article 24 is worded as follows:

"The works of development treated of in the preceding article shall not be executed within a less distance than 40 metres of another's house, nor of a railroad or high road, nor at a less distance than 100 metres from any other exploration or fountain, river, canal, ditch, or public watering place, without the proper permission of the owners, or, in their case, of the municipal council, before the formation of the final project."

Thus, even though the administrative authorities may grant permission, the law expressly prohibits one land owner from sinking an artesian well within 100 metres of the well or other water development of another land owner, without the permission of he who has already developed a flow.

We have noticed that in the case of ordinary wells on public lands, the right simply to sink them is conferred by the authorities; but we will now see that for the sinking of wells or other works for the development of artesian waters on the public domain, a grant of land is made. Article 25 is to the following effect:

"Concessions of lands of the public domain, for the purpose of exploring for subterranean waters by means of shafts, galleries, or artesian wells, may be granted by the administration, always taking care of everything relating to the control, the limitation of propertyship, and the useful employment of the waters discovered, subject to that which the present law prescribes in respect to these particulars. Lands of the public domain can only be granted for these subterranean explorations, whose surface or soil has not been granted for a different purpose, unless that both may be compatible."

The law then directs that there shall be an administrative regulation promulgated which will specify the details of its application; and, hence, we find the royal order to this point, which is made an affix to appendix III of this volume.

Waters flowing in substrata of River Channels.—The waters flowing in the substrata of river beds are public, and concessions may be granted for their discovery and utilization (Art. 192), but even threatened or possible damage to existing utilizations may be a cause why such applications should be refused, or the concessions annulled after being granted.[1] Some illustration of this point is given in the next section, and under the head of Protection to Prior Rights.

Water-Right Concessions.[2]

In all cases other than those of source ownership and of riparian privilege, and of the common utilizations already commented upon, a special authorization from government is necessary in order to acquire the privilege of diverting waters from a natural stream. Utilizations under such concessions or permits are called *special* utilizations of public waters, as distinguished from the *common* utilizations, and are authorized for the supply of populations and railways, for irrigation and canals of navigation, for industrial uses and the establishment of fish ponds and breeding places, but they will be written of here only as applicable to irrigation.—[Article 147.

Practically, for all irrigation enterprises with public waters, other than the watering of gardens or small fields by riparian proprietors, an administrative concession of a water privilege is necessary. There is, as already explained, no such thing as free appropriation of waters, nor is there any possibility of constructing a permanent dam or headwork in a stream, except by special administrative sanction.

It appears that this prohibition has not always been strictly observed, for it became necessary but three years ago to issue the following royal order:

"In view of the fact that works are frequently made in public rivers and small streams without seeking and obtaining the proper authorization, his majesty, the king, desiring to avoid the difficul-

[1] Administrative decision; Royal Decree, July 2, 1882.
[2] See note to first subhead of preceding section.

ties which will be brought about in the future, directs the governors of all the provinces that they issue strict orders to the mayors, not to permit in any public drain or stream, water utilizations of any kind, which are not legally authorized, nor any alterations in those existing, for which permission has not been solicited; directing that the chief provincial engineers, by means of their assistants, exercise the proper vigilance and report to the governors all transgressions which they observe.[1]

All running waters in their natural channels are of the public domain, and subject to the supervising care of governmental, provincial, or municipal authorities. A stream may be wholly within, or dedicated by ancient governmental grant or custom to utilization on some certain municipal lands of common profit or occupation, and its waters be, by custom or local regulation, thus opened to appropriation and use by the people of the town, on lands within the municipal jurisdiction; but the general law makes no provision for private appropriation or utilization, except by special grant or concession, or for otherwise acquiring a water-right, except by use without opposition from the authorities or other parties for the space of twenty years.—[Article 149.

By a provision of the law of August 3, 1866, all persons who then had definite and recognized claims to the waters of a river or stream, were given twenty years from that date in which to fully apply them, and it was declared that, if at the expiration of that term such employment was not complete, the right to the unused surplus should lapse. In the meantime, in all cases when, as hereafter explained, a public inquiry, preliminary to the granting of a concession which might conflict with such right, is to be held, the claimant of the old right is obliged to prove a proper foundation for his pretensions. Not fully utilizing his waters claimed, he is presumed to have no right to them until he proves it as resting upon some ancient title or unconditional grant, and, even this proven, if not utilized within the twenty years, his claim becomes forfeited.—[Article 148.

Concessions for the useful employment of public waters are granted by the municipalities, by the governors of provinces, or by the minister of public works, in the cases and according to the formalities hereinafter explained. Every concession is made subject to such natural and acquired rights as already exist to the waters, and for a term expressed in the articles of the granting

[1] Royal Order, November 15, 1882.

[Art. 150]; where are also specifically stated the nature and purpose of the concession, the quantity of water conceded in cubic metres per second, and, if intended for irrigation, the extent in *hectares*, and location of the lands to be watered [Art. 152]; and, furthermore, waters conceded for one purpose can not be diverted to another without obtaining a new privilege therefor. [Art. 153.] Even when the new use may require less water than the old, the change must not be made without a renewed application, investigation, and permit, for "the conditions and circumstances of the new use might raise objections which it is best to avoid."[1]

Waters conceded for a use such as does not consume them—as for the movement of a power machinery—do not lose their public character, but are subject to the control of the administration after they have performed the duty for which they have been granted. New concessions will always state that such waters must be returned to the stream whence taken, and that the works shall be such as to limit the amount of loss to a reasonably small quantity; and in the case of old concessions, where such clause may have been omitted, the administration will not permit the holder of the water-right to divert the waters to another use after they have performed the duty for which the right was conceded, and he can not do so unless he shall have acquired the right by prescription under the law.[2] All surplus waters over and above the amounts legitimately used up under a concession, are subject to administrative control as public waters. A grantee has no control over the waters of his concession which he can not legitimately use under it.[3]

A concession of water privilege will be annulled by the higher administrative authorities when granted by the provincial authorities in excess of their power, or under a clause of the law not properly applicable to the case. Thus, under article 218 of the law, the governor of a province granted a concession of right to divert water from a navigable river for the use of an industrial establishment situated at a considerable distance from its banks. The matter was brought to the attention of the council of state, and it was decided that the article in question contemplated the use of water in a way such, and only by establishments so near to the stream that no appreciable waste would result, and that in the

[1] Administrative decision; Royal Order, October 27, 1882.
[2] Administrative decision; Royal Order, March 12, 1882.
[3] Administrative decision; Royal Order, April 10, 1881.

case submitted there was an appreciable waste in conducting the water to the establishment and returning it to the river, as well as in the use, and hence the concession should be annulled; and this was done.[1]

In concessions of special privileges for the employment of public waters the uses to which such waters may be put are classified, and preference is given to applications of a higher over those of a lower class, and within each class the undertakings of the greatest importance and utility, or, other things being equal, the first applicant, is given preference. The following is the order of classification: (1) the supply of towns; (2) the supply of railways; (3) irrigations; (4) canals for navigation; (5) mills and factories; (6) fish ponds and fish breeding places. But all of these uses are subjected to and made subordinate to the common utilizations of waters, spoken of under the first subheading of this section, and defined in article 126.—[Article 160.

Any concession for the useful employment of waters will become extinct if the terms and conditions according to which it is granted be not compiled with; and all water rights whether obtained by concession or otherwise, are subject to expropriation, or condemnation, on account of public utility, in favor of another application of the waters, of a higher order in the scale of preference already spoken of.—[Articles 158 and 161.

Concessions for the employment of public waters are considered as including that of the public lands, if any, necessary for the construction of works, etc.—[Article 151.

Concessions of water to land owners individually or collectively, for the irrigation of their properties, are made in perpetuity; while those made to associations, companies, or capitalists, to irrigate the lands of others in consideration of payment therefor, are made for terms not to exceed ninety-nine years, and upon condition that at the expiration of the time the ownership and control of the works shall pass to the owners of the lands irrigated, organized into an association as by the law provided.—[Article 188.] But in all cases of water utilization for irrigation, navigation canals, and sanitary improvements, the water falls and power, factories, and industrial establishments, which shall have been constructed or erected upon the canals by the grantees, shall forever remain their property.—[Article 159.

[1] Administrative decision; Royal Order, November 25, 1882.

The extravagant or wasteful use of public water, or holding water-rights without fully utilizing the water is not permitted. In cases of water utilization where the amount of the claim has not been fixed in a concession, the minister of public works is clothed with authority to ascertain the amount of water actually required and applied for the purpose, and only this quantity is understood to be conceded. Furthermore, the administration will cause the water user to construct such headworks and measuring apparatus as will render easy the gauging of the waters, and make it possible to detect at once the fact of more water being taken than the right calls for. Thus, upon the passage of the general law, all water claims in Spain, whose amounts were not already fixed in concessions and regulated by rated headworks, were subject to investigation—a proving up of actual necessities and utilizations, a reconstruction and rating of headworks, if necessary—and to a limitation in claim to correspond with the facts of economical use at that time.—[Article 152.

The general water law, after providing in former articles for the gauging and limitation of water claims as above written, closes its long section on the employment of public waters for irrigation with the following:

"Article 204. For the general interest in the better employment of waters, the minister of public works shall direct what shall be done for the examination of the existing rivers, with the view of providing that no irrigator shall waste the water of his allotment, which might be of use to others in need of it, and with that of preventing the waters of freshets from flowing unproductively, and even injuriously, away to the sea, when other districts are longing and begging for irrigation and regular applications of the water, and without injuring acquired rights."

This is certainly a significant paragraph to be found in a newly made and formal general law of a great country, where irrigation has been in progress for centuries, and where we might have supposed the problem of economical use and conservancy of waters had been mastered long ago. In this connection the words of a recent administrative decision on this point are worthy of translation. They are:

"The spirit of all the legislation for waters, before and since the law of August 3, 1866, is that the greatest possible protection and utility of the public waters shall be enforced for the general and private interest, for which reason a volume of said waters granted cannot be monopolized, unless they are used for the purpose for

which they were solicited; on which point the appellant has fallen into a gross error, in supposing that by the concession he had acquired a perpetual right to the waters without using them for the purpose for which they were intended."[1]

On the other hand, if in the issue of a concession an error be made in the expression of quantity of water conceded, or if from any other cause the amount does not meet the requirements of the grantee, the administration is not to be held responsible, for the law expressly exempts the government from any such responsibility. The grantee must take care of his own interests in this regard.

When a concession has been issued embodying conditions relative to construction of works and delivery of waters, the grantee accepts it upon such terms; it is regarded as a contract between him and the government standing for the public at large and especially for interested parties other than the grantee, and only when he has fulfilled the stipulations does he receive a certificate of right to take and utilize the waters.[2]

The special terms and conditions of water privilege concessions made to companies, associations, and others who contemplate selling the use of waters—their duties, obligations, privileges, and benefits—will be written of in a subsequent chapter under the headings of Irrigation Organization, and Governmental Policy.

Authorizations—Applications.[3]

Powers and Duties.—In seeking water privileges, the following formalities are to be observed:

Except in the certain municipalities or localities where otherwise ordered by municipal ordinances or local custom, for permission to construct works in or divert waters from a small stream devoted to town use, the authorization of the mayor is necessary. —[Article 178.

Where, in order to divert rain-waters or intermittent spring waters from a torrent bed on public lands, it may be necessary to construct a permanent dam or other structure, the authorization of the governor of the province is necessary.—[Article 181.

When, to conserve or store waters on the public lands, it may be necessary to construct reservoir dams, the authorization of the

[1] Administrative decision; Royal Order, September 21, 1879.
[2] Ministerial circular, *Bentaból y Ureta*, Vol. II, p. 309.
[3] See note to first subhead of preceding section.

governor of the province is, and that of the minister of public works may be, necessary.—[Article 182.

Where, on any river except a large and navigable one, a riparian proprietor desires to pump water by machinery for the irrigation of his bordering lands, or even on navigable rivers if injury to navigation is in the least threatened, or on any river if steam is to be used as a motive power, an authorization from the governor of the province is necessary.—[Article 184.

When, by means of a dam, weir, or other permanent work, it is desired to divert for purposes of irrigation from any river, ravine, small stream, or other continuously flowing natural current, a quantity of water exceeding 3.53 cubic feet (100 litres) per second, an authorization from the minister of public works is necessary.—[Article 185.

If, in the last case, the quantity of water should not exceed the 100 litres per second, the governor of the province may make the concession; there being, however, an appeal from his action to the minister of public works.—[Article 186.

Governors of provinces may also authorize the reconstruction of old dams; and simple works of repairs on existing structures may be done without authorization, but notification of them must immediately be given to the governor.—[Article 186.

The governors are limited in their power such that they can not grant more than one water privilege to any one work of diversion.—[Article 187.

Applications.—Applications for concessions of water privileges, either to individuals or associations for the irrigation of their own lands, or to associations or companies for the irrigation of the lands of others, must be accompanied by: (1) the plans, descriptions, specifications, and estimates of cost of the proposed works; (2) if the application should be by an individual to irrigate his own lands he must, in addition to the above, submit proof of his ownership; (3) if by several individuals for a collective work, the agreement of a majority, computed by superficial area of lands, must be likewise produced; and, (4) if by a society or company to irrigate lands of others, there shall be exhibited the tariff of rates which it is proposed to charge.—[Article 189.] The forms of application, administrative inquiries preceding the grantings, and the terms of concessions, will be found fully explained in the translated regulations affixed to appendix III.

Protection of Prior Rights.[1]

Priority of right is most carefully protected by the Spanish law; every concession of water-rights is understood to be made without injury to third parties, and maintaining the rights of riparian proprietors and others; and in every case the common utilizations of water are preëminently respected.—[Articles 150 and 160.] When employments of water exist by virtue of recognized and valid rights, a new concession can be made only in case that, upon gauging the waters, in ordinary years, the quantity desired is shown to be a surplus after supplying existing claims. The gauging having been made, the proper time for irrigation shall be taken into account, in order to determine the quantity of water necessary for the lands cultivated and irrigated, and in time of scarcity the later grantees must suffer the shortage until the older users shall have been fully supplied.—[Article 190.] But the gauging of the summer flow of streams is not necessary when it is intended to issue new rights to winter, spring, and torrent waters only, which could not be used on the lower lands.—[Article 191.

When opposed by owners of existing water utilizations, a new concession can not be granted on a stream until it shall have been shown by an examination and gauging of the water-supply, and of the necessities of the utilizers, that there is a surplus of supply over the rights of existing utilizations, available for the proposed concession. A concession granted by a governor of a province, even of a class such as under the law he has power to grant, if made before the surplus of waters is shown to be available, will, on appeal, be annulled by the administrative authorities of the central government.[2]

Waters in the Gravels of River Beds.—Waters flowing in the gravels beneath the surface of channel beds, are considered as the property of no one, and subject to discovery and consequent ownership, as in the case of subsoil or artesian waters. Thus, when by the authorized construction of a submerged dam or other structure across a channel bed, waters are caused to flow at the surface, and are made available for diversion and use, which formerly passed on down stream through the gravels and sand, such waters are regarded as discovered, and the right to them is vested

[1] See note to first subhead of preceding section.
[2] Administrative decision; Royal Order, March 5, 1880.

in the discoverer; but irrigators and other users lower down have the right to object and prevent the diversion should they be able to prove that it deprives them of waters held by prior concessions. —[Article 192.

Whenever, by the diversion of waters from a river, mills or industrial establishments are deprived of or embarrassed in their supply, they must be indemnified to the full amount of their injury, and if this can not be done by and under private arrangement, the law of expropriation shall be invoked in the case, and the property condemned and fully paid for by the parties doing the injury.—[Article 193.

Moreover, if, by the construction of works to discover waters flowing in the substrata of a river bed, an injury be threatened to rights already acquired to the use of waters lower down, the government will not permit such works to be built, and will annul a concession for them if it appears that the injury could not be remedied. A very late administrative decision on a case in point, closed with the following words: "And considering that although it is certain that the concession made by the *registrador*, of the mine of waters *San Isidro*, has been made without prejudice to third parties, so that if the works which Don Pablo Prat might have undertaken in the sub-bed of the river Tordera should affect the amount of this stream, the said mining concession would be annulled, yet this guarantee is void from the moment from which it causes fear that damage would result to the course of the waters by said works, because the damage would be irremediable, and it would be humanly impossible to return things to the condition in which they were before."[1]

It would appear from a still later decision that concessions of privileges to search for and bring waters to the surface in the substrata of river beds are no longer issued when it is at all probable that such waters are identical with those which rise and flow in the stream lower down, and to which rights have been granted or acquired. The wording is as follows:

"It is not possible, on good principles of administration, to tolerate that they should be diverted from their natural course, not even by authority of a special concession legally granted, neither those above the surface and apparent, because the law guarantees them to the towns and lower proprietors who of old acquired rights

[1] Administrative decision; Royal Decree, July 2, 1882.

to the use and employment of them; nor those subterranean or concealed, because, under the proper interpretation of the general law of mining, of December, 1868, and under the resolution of opinion of the council of state expressed in the royal decree of July 2, 1882, * * * these concessions would contribute to the insuperable injury of the public and must not be granted."[1]

AUTHORITIES FOR CHAPTER XIX.

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[1] Administrative decision; Royal Decree, March 9, 1883.

CHAPTER XX.—SPAIN[5];

THE NEW GENERAL WATER LAWS[2]—THE RIGHT OF WAY TO CONDUCT WATERS.

SECTION I—*The Servitudes of Aqueduct and of Abutment.*
The enforced Right-of-Way.
The enforced Right-to-abut-a-Dam.

SECTION II—*Expropriation on account of Public Utility.*
General law of Expropriation.
Special provisions in the Water Law.

SECTION I.

THE SERVITUDES OF AQUEDUCT AND OF ABUTMENT.[1]

The Right-of-Way for a Water Conduit.

The old laws of Spain speak of the servitude of aqueduct, as did those of the Romans—defining it as a right to conduct waters over the property of another, acquired by agreement, division of estates, or by prescription. There is no mention of a legal right, inherent to all lands requiring irrigation, to have a right-of-way for waters enforced in their favor through other lands. The first mention of the enforced servitude of aqueduct is found in a law of 1849[2]—one of the series of progressive acts in this line which immediately led up to the general water law of 1866.

This law of 1849 was passed about four years after the first French one on the same subject, of which section 2 of the foregoing chapter VI speaks, and the part relating to the servitude of aqueduct is worded much like it in leading particulars, so we may

[1] See, Pardo; also, Bentaból and Ureta, Laws and Regulations cited, and others under heading "Servitudes."

[2] Law of June 24, 1849, concerning exemption from taxes of new irrigations and factories, and concerning the servitude of aqueduct.

fairly conclude that the Spanish legislation was modeled after the French on this point. Then followed a royal order in 1852, giving instructions at length for the observance and application of the law, and these were made the basis of that part of the law of 1866 which relates to this subject. After the passage of the general law, and up to 1879, five royal orders concerning the enforced servitude of aqueduct were issued, and then we have the general water law of 1879, on which the following remarks are based, except where otherwise credited.

The Enforced Servitude of Aqueduct.[1]

The right of way to construct a canal or other water conduit for purposes of irrigation or of drainage, can be obtained over private lands, for public or private works, as an enforced servitude. —[Art. 77.] The proceeding is altogether an administrative one, conducted by the chief provincial authorities; there being an appeal to the administrative courts, but not before the civil courts. When a declaration of enforced servitude is desired, the application must be made in due form to the governor of the province, by the petitioner himself or his authorized attorney, setting forth the purposes for which he demands the right of way, the route by which he desires to locate it, as illustrated by maps and measurements, showing also the topography on each side of the route, and accompanied by documentary proof of his ownership of the lands he desires to irrigate, and of his undisputed right to the waters to be conducted for the purpose, and also by the report of an engineer explaining the situation and giving the reasons for selecting the route desired. The governor will investigate the matter, bringing about a meeting or meetings before himself of the interested parties, publishing notices of meetings, notifying the *alcaldes* of the towns interested, and hearing all arguments for and against the proposition.

These proceedings may be spread out through a month, in an ordinary case, allowing for the times fixed for publications and notices to elapse. The documents are next all turned over to the chief civil engineer of the province, who examines them and the ground to be traversed, and reports his opinion and recommendations to the governor, who then lays the matter before the provin-

[1] See, General Law of Waters, 1879, articles cited, and, generally, chapter IX, "Servitudes;" also, see note to this section heading.

cial council, and with its advice he acts, granting or denying the prayer of the petitioner. There is an appeal from the decision of the governor to the minister of public works, to be taken within thirty days, after a notification of fifteen days, and the governor himself may bring the matter before the minister without deciding it, if he so elects.[1]—[Articles 78, 79, 251, and 253.

An enforced servitude of aqueduct may be established temporarily, or as a permanency; but, for the purposes of the law, it is considered permanent when its duration exceeds six years. As compensation for temporary occupation of the ground, etc., by a canal or other conduit, under an enforced servitude, the holder of it must pay in advance to the owner of the land, a sum equivalent to double the just rental on the space occupied, for the time of occupation, together with duly assessed amounts for damages and injuries to the rest of the property, including compensation for inconvenience due to a dividing of the land by the work, and the presence of the work itself; and, moreover, it is his duty, and he is legally bound, to restore the surface of the ground to its former condition, at the expiration of the term of his servitude. For a permanent servitude the grantee must pay in advance, as above, the full value of the land occupied, together with compensation for the damages, injuries, and inconveniences spoken of. A temporary servitude cannot be prolonged, but it may be converted into a permanent one, without any further examination, by the grantee paying for the land in full, less the amount paid for the temporary servitude. But when a conduit is to be enlarged across lands not the property of its owner, applications and proceedings must be had and a decree made as though it were a servitude for an entirely new work.—[Articles 87, 88, 89, and 94.

When not dangerous to travel or grazing animals, on account of its depth or situation, or not otherwise specially inconvenient to the land owner, an enforced servitude may be established for the construction of an open ditch. When, in the opinion of the competent authorities, the dimensions or situation of the work, or other circumstances, require it, the ditch must be covered. When waters in other lands or works may be drawn out, or when there is danger of pollution of the waters, or of supersaturation of the soil, or from other cause it is considered necessary, the conduit must be made as a closed culvert or pipe. All works necessary for the

[1] Ministerial instruction, December 20, 1852, still in force.

construction, preservation, and cleaning of the conduit must be paid for by him who has obtained the servitude; and for this purpose he is accorded the privilege of occupying temporarily such land as may be necessary, previously paying damages, if any, and compensation for inconveniences caused by his work. The land owner, or the administrative authorities, may at any time take steps to force the canal owner to execute necessary works of repairs or cleaning.—[Articles 86 and 90.

In the decree establishing an enforced servitude of aqueduct, the width of the land to be occupied by the work, and of that to be known as the margins, is fixed after due consideration of the amount of water to be carried, the character and grade slope of the conduit, the nature of the ground traversed, and the necessity for continuous communication along the route; and the right of passage along and over this width of territory is inherent to the servitude. If the conduit should cross public or private roads the owner of the servitude must construct and maintain the necessary bridges and culverts; and if it should cross other conduits it must be in a manner not to obstruct or accelerate the flow of their waters nor to deteriorate their quality.—[Articles 91–93.

A right of way for a water conduit cannot be enforced for objects of private interest only, through existing buildings, gardens, and orchards, but for public works this may be done. Neither can such right of way be located through an existing canal unless the owner of it consents. If after such consent the owner of the land objects, the proceedings may be carried forward as already explained.—[Articles 83 and 84.

The imposition of an enforced servitude can be successfully resisted on either one of two grounds. The first is, that the applicant for the servitude does not own the land on which he proposes to use the water, or that he has not a right to the water for the purpose. If this point is raised the questions of ownership and right are carried before the courts, to be decided before the administration will move in the matter of the servitude. The second ground is, that the route can be established over other properties with equal advantage to the person who desires it, and with less damage to those who have to suffer the burden. When this point is raised, the administration investigates and decides the matter. —[Articles 82, 83, and 84.

It follows from the first of these points, that a servitude for a water conduit cannot be imposed except it be by some one who

already has a water-right, as a riparian proprietor, as the owner of artesian waters, or as a grantee of a privilege from the government. And it is a natural consequence of the second point, that a route for a right of way is carefully studied by competent persons before application is made for the enforcement of the servitude.

When right of way is desired as a servitude for a public canal built by the general government, in cases wherein expropriation is not required under the law, the minister of public works decrees the servitude, after due examination and payment; and if the works are built by the province or a municipality, the governor of the province is authorized to act.—[Article 75.

The Right to Abut a Dam.[1]

The enforced servitude of abutment for a dam made its appearance in the Spanish laws, for the first time, in 1866, as a section of the general law of waters. This was nine years after the passage of the French law specially on this subject (see p. 140, *ante*), and in the year following the adoption of the new civil code of Italy, wherein the declaration of this right first found place for that country as a whole.

As in the case of the right to acquire a location for the construction of a canal or other water conduit through the property of another, the exercise of this abutment right is altogether an administrative proceeding. When a private person, having a privilege as a riparian proprietor, or a special right as a grantee of a privilege from the government, to divert water from a stream, not being the owner of either bank, or of only one, desires to construct a dam or weir for the purpose of diverting waters, under the right or privilege, and the bank owner objects to the work being placed on his land, the exercise of this right-to-abut-a-dam is invoked. The person desiring to avail himself of it makes application to the governor of the province, as in the case of application for right of way over another's land, and proceedings are had similar to those explained under the foregoing subhead.

He in whose favor a servitude for abutment of a weir or dam is determined on, is required to pay in advance to the owner of the property the full value of the land occupied, as estimated and ordered by the governor, and, after the construction of the works, to pay an indemnity for damages or injuries done the property at

[1] See, note to preceding subhead.

large. In like manner a right to construct a weir or partitioner in a canal may be acquired of the adjacent land owners when he who seeks it has the consent of the canal owners. The servitude of abutment may be enforced not only for the benefit of private individuals, but for that of companies, associations, and public works, as well.—[Articles 102–106, and 253.

The proceedings to enforce these servitudes of aqueduct and abutment are so very simple, expeditious, and inexpensive that irrigation is certainly on a good footing in this respect in Spain: a private person, company, or association, having a water privilege and land to irrigate, desiring the unquestioned right to place his dam and build his canal, has not a long series of law suits before him, but a simple proceeding to determine the best place for them, and the fair value of the land to be occupied, and extent of the damages inflicted. These points fixed, on making payment, he acquires his desired privileges. If the system does not work well in the interest of irrigation, it must be because of faulty administration.

SECTION II.

Expropriation for purposes of Public Utility.[1]

The General Law of Expropriation.[2]

One of the series of steps in advance made in the legislation of Spain, under the influence of the constitutional spirit and at the instigation of the liberal party, after the downfall of unlimited monarchy by the death of Ferdinand in 1833, was the passage, in 1836, of a law prescribing the constitutional method of taking private property for public purposes. This act continued in force until superseded by the present law, passed in 1879, and which, with its administrative regulation of the same year, forms, with the general water law of 1879, the basis of the present article.

Article 10 of the Spanish national constitution authorizes the taking of private property for purposes of public utility, in cases and according to forms to be prescribed by law, and the expropriation statute makes the necessary provision of these forms, etc.

[1] See, Pardo; also, Bentaból and Ureta, laws and regulations cited, and others under heading "Expropriation."

[2] See, expropriation law 1879, and ministerial regulations thereunder. Articles cited by number from the law.

Works of public utility are defined as those whose special object is to furnish to the state, to one or more provinces, or to one or more towns, any uses or improvements whatever, delivered over for the general good, whether they be carried out by the state, the provinces, or the towns, as the case may be, or by duly authorized companies or private individuals. Four steps are prescribed in the taking of private property for public purposes: (1) The declaration that the purpose for which it is to be taken is one of public utility; (2) showing that the execution of the purpose indispensably requires the taking of the whole or a part of the property to be condemned; (3) appraisement of the value of that which has to be taken; and, (4) payment of the price of the enforced purchase.—[Articles 2 and 3.

In the case of works carried out wholly as public works of the state, a province, or a municipality, and under the general law of public works, a declaration of public utility is not necessary, in order that property may be expropriated for their location or use. —[Article 11.

When works carried out by private enterprise or companies are to receive a special subsidy or other financial aid from the government, or when works are deemed of special importance by the government, the declaration of public utility is made by special law. When they are simply to receive a part of the regular appropriations at the disposal of the ministry, and when they affect the interests of more than one province, the declaration of public utility is made by the national administration, without special legislative enactment. In the case of works of interest to only one province or to the municipalities therein, the governor makes the declaration.—[Article 10.

To have a work declared of public importance, application must be made to the competent authority, accompanied by complete plans, estimates, and explanations in detail, and the arguments in favor of the proposition, all in duplicate. The fact, nature, and bearing of the application is then officially published in the provinces and towns likely to be interested; a hearing of objections, if any, is had before the authority acting in the matter; and, finally, the declaration is made or refused, as may appear proper.—[Article 13.

A work having been declared of public utility, it is the duty of the administration to determine what property it is necessary to take in its favor, whenever a proposition is made. The person or

corporation, as the case may be, whose works have been declared of public importance, applies to the governor of the province to condemn lands, buildings, or other property, for the location of works—a canal, headworks, or other necessary feature of the enterprise, for instance. The application must be accompanied with descriptions in detail, and plats illustrating the property and its ownership, and showing the necessity for taking it. The governor notifies the *alcaldes*, or mayors, of the towns; an examination is made to see that the exhibits correspond with the facts as shown by the land registers; an official publication is made; a hearing of objections is had; and a decision as to the necessity of occupation is made by the governor within fifteen days from publication; and, finally, an appeal may be taken from the action of the governor to the minister of public works.—[Articles 14–19.

Following the determination as to the necessity to take certain property, or parts of it, comes the proceedings to designate exactly the parts to be taken and the valuation to be paid therefor. A notification of intention is published by authority of the governor, and, when possible, the parties at interest are personally summoned to appear before the respective town mayors to nominate appraisers. The owner or owners of each piece of property to be taken names an appraiser to act in conjunction with one selected by the government, or by the parties in whose interest the condemnation is to be made. The appraisers must be acknowledged experts, and are almost always civil engineers. They measure the property to be taken, and report, jointly or separately, its value, to the mayor, who transmits these reports, with his opinion, to the governor; and all the expenses of appraisement are paid by the party at whose instance the proceedings are being had.—[Articles 20–25.

Following the receipt of the reports as to valuations, the governor makes an offer to the owner for each piece of property. If he accepts, the matter is settled. If he refuses, he must show by the figures of his appraiser that the offer is not just. If the appraisers do not agree, a third one is nominated by the judge of the district civil court, at the instance of the governor, and, in the end, the matter may be appealed to the minister of public works. The amount to be paid in all cases is that determined upon as the fair market valuation of the property, plus three per cent as a bonus.—[Articles 26–36.

It will have been seen that the foregoing is purely an adminis-

trative proceeding, and that it is summary and may be expeditious. This method of acquiring title to property for a work of public utility, is generally that resorted to for acquiring right of way for all main works of irrigation, while for the minor works of large enterprises, and for small or individual canals or ditches, the servitude of aqueduct is enforced, as explained in the foregoing section.

Expropriation Provisions in the Water Law.[1]

Besides the general cases in which the declaration of public utility may be made in favor of public enterprise, as specified in the law of expropriation, the general law of waters contains some special clauses relative to declarations of public utility and condemnations of private property in favor of irrigation enterprise. Thus, the expropriation law requires that a work shall be of special importance, or have for its special object to furnish to the state, a province, or town, the use of something or of the work itself for the general good, before it can be declared of public utility, but article 200 of the water law says: "works necessary for the employment of public waters in irrigation, may be declared of public utility, for the operation of the law of enforced expropriation, provided that the volume of water exceeds two hundred litres per second." Thus, an individual enterprise for the irrigation of private property, even, when the volume of water exceeds seven cubic feet per second, which would be equivalent to a little stream seven feet wide, one foot deep, and flowing at the very slow rate of one foot per second, may be declared of public utility, and have private lands condemned and enforced purchase of them made for its right-of-way or headworks site.

The waters of a spring or brook wholly on private property, even when utilized, are subject to expropriation for the supply of towns, when it is made to appear to the satisfaction of the minister of public works that there are no public waters available for the purpose. Railways, in all cases, have the right to invoke the power of eminent domain, to expropriate waters for their necessary uses. When an authorization or concession is issued for a water storage enterprise, the grantees of the concession have the right accorded of enforced purchase of water-rights already accrued on the stream below, provided it is necessary to extinguish either right in favor

[1] See, general law of waters, 1879, articles cited.

of the other. In case of unavoidable interference of one water utilization with another—as when higher irrigations take water to the detriment of mills using it for power lower down on a stream, the irrigators may ask to have the lower water-rights condemned in their favor.—[Articles 167, 175, 183, and 193.

And, in general, every special employment of public waters is subject to enforced purchase, without the passage of a special law, on account of public utility, in favor of another utilization of higher order in the scale of uses already spoken of, and as shown in article 160 (see appendix III). That is: water used to supply canals of navigation, mills, or factories, or fish ponds, is subject to expropriation for purposes of irrigation, but water used for irrigation, as well as for the other purposes mentioned, can be, in its turn, condemned for the supply of railways or town populations, which rank higher in the scale. And, finally—an important point—one irrigation water-right may be condemned in favor of another irrigation enterprise of greater public importance. But, as the "common" utilizations rank higher under the law than the "special" utilizations, rights to use waters "for drinking, washing clothes, vessels, and other objects, for bathing, and watering or washing of cattle or horses," cannot be expropriated in favor of its use for irrigation or any other purpose, except in cases of great works and by virtue of a special law.—[Articles 126, 160, and 161.

The possession of waters or rights to them is an essential preliminary to the obtaining of a declaration of public utility in favor of a work, and the holding of a concession or permit to search for and discover subterranean waters and cause them to flow on the surface of the ground for a public use, is not a sufficient evidence of having control of the water itself. Before the declaration of public utility will be made, the waters, in such a case, must be discovered and caused to flow in sufficient volume to make their application of public importance for the purpose intended.[1]

AUTHORITIES FOR CHAPTER XX.

Pardo.—[Work cited as an authority for chapter XIX.] See, law for expropriation, pp. 105–126, and ministerial regulation under said law, pp. 579–630; law of public works, pp. 12–48, and ministerial regulation thereunder, pp. 48–104; law concerning enforced servitude, pp. 148–151, and ministerial regulation thereunder, pp. 156–159.

Bentaból y Ureta.—[Work cited as an authority for chapter XIX.] See, Royal Orders, under the headings "Expropriation" and "Servitudes."

[1] Administrative decision; Royal Order, June 11, 1879.

CHAPTER XXI.—SPAIN[6]; THE NEW GENERAL WATER LAWS[3]—ADMINISTRATION AND POLICE OF WATERS AND WATER-COURSES.

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SECTION I.

General Administration of Waters and Water-Courses.

Governmental Organization.[1]

The towns or municipal districts, of which there are 9,361 in Spain, are the political units of the Spanish governmental system, and correspond in this respect to the French and Italian communal organizations. These towns, or *pueblos*, grouped, form

[1] See, Cyclop. Pol. Sci., Amer. Enc., Johnson's Enc., and Martin, 1882, articles "Spain."

the provinces, of which forty-six compose Spain, exclusive of her island dependencies.[1] The constitution of 1869 guaranteed municipal and provincial liberty, in the following words: "The organization and duties of the provincial legislatures and the municipal assemblies shall be ruled by their respective laws;" and the constitution of 1876 further guaranteed political freedom by saying, "the government and direction of interests peculiar to the provinces and the municipal districts shall be ordered by their respective organizations."

Each town has its municipal council or *ayuntamiento*, of four to twenty-eight members elected every two years by general manhood suffrage, and presided over by a mayor or *alcalde*, chosen by them annually from amongst their own number. The entire municipal government, with power of taxation and nomination of local judiciary, is vested in this *ayuntamiento*, which is at once a municipal legislature and executive council for its *pueblo*, independent of superior governmental restraint or interference, so long as it keeps to its duties of town government, as prescribed in the constitution.

From the town governments flow those of the provinces. The *ayuntamientos* elect representatives to the provincial *diputaciones*, which are the law-making assemblies of the provinces. In these legislatures are vested all power of taxation within the provinces, other than that held by the *ayuntamientos*, and the determination of questions relating to public institutions and works upon which provincial funds are to be expended. The provincial *diputacion* meets annually and elects from amongst its number a permanent committee, called the provincial commission, of three to six members, which is in constant convention between the legislative sessions, performing certain executive duties, acting as a board advisory to the civil governor, and as an administrative court of appeal from the decisions of the mayors and of the governor.

The general government, holding a constitutional check on provincial legislative action, appoints the chief executive officer of the province, in the person of the civil governor, who, besides being the active head of the provincial administration, has a certain power of holding in suspense the effect of legislation until it can

[1] The area of Spain exclusive of the island provinces is 194,360 sq. m. The average size of a town jurisdiction would, hence, be 20.7 sq. m.—a tract little more than 4x5 miles in extent; and of the provinces, 4,225 sq. m.—a region 65 miles square.

be considered by the general council of state in testing its constitutionality, if necessary.

The cortes, composed of a senate, with membership partly elective and partly hereditary and honorary, and a congress whose members are elected in each electoral district according to its own laws, is the law-making body of the kingdom; and the king has also a voice in legislation and the power of initiating legislative measures to be considered by the cortes.

The Administration.[1]

The national administration under the king is vested in his nine ministers, who are responsible for their actions to the cortes, and who together compose the council of state, and groups of five of these members sit as sub-councils, or sections of the council, on matters pertaining to certain bureaus. There is a minister of public works, and also a section of the council which deals with public works affairs, such as do not necessitate attention from the full council. The minister of public works is at the head of the bureau of commerce, agriculture, and public works, and within the latter branch is the administration of waters, water-courses, and irrigation in the kingdom. Presiding over this department is a director of public works; and a corps of civil engineers are his personal agents in the performance of the technical part of his duty, both upon works and water-courses.

The governors of the provinces and under them the provincial civil engineers, and the *alcaldes* of the *pueblos* and under them the municipal police, are the civil administrative officers, to carry out the regulations and instructions concerning waters and irrigation, issued by the minister, and to perform such other duties in administering the law as the law itself directs.

The provincial councils act as administrative courts, and in advising the governors and determining questions under the regulations, and the council of state is the highest court of appeal on all questions of administrative action. In the general administration of waters, therefore, there are the executive officers—the mayors of towns, governors of provinces, and minister of public works; and the advisory councils and administrative courts, the provincial commissions and the council of state; and the provincial and

[1] See, Bentaból and Ureta, headings "Attributes of the Administration," and "Jurisdictions of the Courts;" also, authorities cited for preceding subdivision.

governmental engineers are the technical advisers and active supervising agents.

The general powers and duties of the members of this administrative régime will be quite well understood from reading what is said incidentally to other special topics in these chapters, but especially from a reading of sections 248 to 252 of the law found in appendix III; and the relation of the administrative and civil courts to our subject, may be well studied in articles 253 to 256 of the same law, to all of which attention is here asked.

The active local agents of this administration of waters and water-courses, the *alcaldes*, and the provincial civil engineers and their assistants, report to the governors of the provinces; and these, in turn, to the minister of public works. The ministerial action is taken in the form of regulations, giving instructions in detail for carrying out or availing of certain portions of the law; circulars, giving general instructions concerning executive duty; and orders or decrees, deciding special points or questions. When a question is appealed beyond the minister, the council of state renders an advisory opinion, and the result is promulgated in the form of a royal order or decree.

Application of the System.

For the purposes of this report, and after the fuller treatment of the French administrative system, it is unnecessary to go into details of the Spanish governmental supervision of water-courses. The organization is much less extended and complete than that of France; the practice is confined more to generalities and less to local specialities; and the service has been made efficient only within the last few years.

It is a remarkable fact that during all the overhauling which the affairs of Spain have recently had under the liberalizing spirit of the constitutional parties, and notwithstanding the establishment of the independence of municipal and provincial government —making the *ayuntamientos* free and elective and with power to choose their *alcaldes*—the constant tendency has been to take all control of waters and water-courses out of the hands of the municipalities and provinces, except in so far as the mayors act as agents of the general government in executing the general laws and the administrative regulations under them. The municipalities seem to have been entirely shorn of their former large measure of in-

dependent legislative as well as executive control over natural streams through the lands of their jurisdiction; the general government in asserting its supremacy in this respect, as we shall see in the next section, has chosen to place the local control of waters, where necessary, into the hands of irrigators organized into communities specially for the administration of irrigation matters, rather than leave it in the hands of the political town organizations.

SECTION II.

Administration of Waters—Irrigation Association.

Self Government in Irrigation.

Self government in irrigation has its root in the individual control of waters in private ownership. It steps thence to that of waters public but in the private possession of the cultivator in his fields of irrigation. And so, by degrees, following up the water's flow, it has been applied, in the persons of irrigators, and in the interest of irrigation, to the management of systems of artificial works of small and great degree, and, even, of large natural streams in whose waters there is an unconsolidated community of interest, and of which an equitable division has constantly to be made to a number of works or districts. Thus has this principle been carried to its extreme in application.

It is in doctrine the reverse of an autocratic governmental administration of water-courses and waters, and in application commences at the other extreme of the water's course. General government, be its nature what it may, of a right representing the public interest at large, becomes the guardian of public waters and their channels. As such guardian, its functions have been applied, in some countries, to the construction and management of works for the conducting out and distribution of these waters in irrigation—in no less a free country than was France under the last empire, irrigation itself was conducted in some districts, on the private lands, by public irrigators appointed by the prefect of the department, himself the appointee of a minister of the central government. Thus was this principle carried to its extreme in application.

Where should these opposing systems meet? Where should

governmental control of public waters cease, as they flow on to enrich the lands of private individuals? Where should the irrigation interest take special control of waters to be devoted to its needs, which have but the moment before been the property of the public, uncontrollable by any special interest? Should, on the one hand, works and waters of irrigation come under governmental control; or, on the other, should the streams of the public pass, ungoverned, into the hands of those who seek to divert and consume their waters? This is a great question. One which has occupied the minds of men in many lands, under conditions much varied, and the student of such matters will find that there is no one answer which might properly have been given in any large part of the practice. The structure of governmental administration; the political, social, and industrial condition of people—their antecedents in this regard, as well as present status—and the physical conditions attendant upon the water supply and lands, all influence the solution of this question. It has, consequently, been answered many ways. Southern and eastern Spain have been the field of developments in this line that, even under a monarchial and often tyrannical rule, has resulted in an extreme application of the principle of self government in irrigation matters; for, large natural and public streams in those regions have been wholly controlled and governed by irrigators, and, in instances, by some irrigators to the exclusion of others: the stream itself virtually became community property. Witness the case of the Jucar, as controlled by the Valencian associations, of which I have written in chapter XVII; and this is only one example of many which might be cited. And, as an outcome of these local instances, we find in the very new general water law of Spain, a recognition of the principle and provision for its application, in a conservative and guarded way, to be sure, where desired by irrigators or deemed necessary by government. Let us see how this has come about.

Development of Local Irrigation Administration.

From very early times the people of southeastern and eastern Spain have been cultivators and irrigators. The prosperity of the country has depended almost wholly on the use of water in irrigation, and there have been no centralized interests or industries opposed to the taking of water from the streams. This was not

the cattle raising and sheep growing quarter of Spain; the climate and natural productions were not favorable to these pursuits. The streams were not navigable, neither were they tributary to navigable rivers, and, hence, not on account of commerce either, was there public interest in them as such. The utility in the streams was in the taking of their waters out.

In the meantime, the government of Spain has changed hands over and over again. But the greater struggles, and the scenes of political supremacy have been in other parts of the peninsula. The irrigation quarters of the east and southeast were cut off from central Spain by rugged mountain ranges, and were looked upon as outside provinces. They were the regions last reconquered from the Moors, and their people were of quite different type, manners, and customs. For long years there was no stable and fixed government in these regions, which could administer the public domain. Custom had, during still more unsettled times, led the irrigators to do as they chose with the streams from which they took waters. When, finally, a more settled condition of things followed the final expulsion of the Moors, the new conquerors were glad enough to purchase quietude on the part of these half Moorish people, in their region distant from the centers of Spanish power, at any price which did not harm Spaniards or the government. The irrigators demanded control of the waters—that their "ancient customs and rights be recognized"—and this was given them.

As we have seen by a few instances cited in chapters XVII and XVIII, the early Spanish kings seemed glad enough to deed the waters, with control of streams implied, to the irrigators of Valencia and Murcia, and this has been the foundation of the system of self government in irrigation which has grown up there. The streams themselves were actually or virtually granted to the irrigators. Very many water-rights of this kind now exist throughout this quarter of Spain, which date from the twelfth, thirteenth, or fourteenth century, and practice under them has strengthened the custom of local government of natural streams. And at no time since has the political system been sufficiently fixed and an administration long enough established to admit of systematic management of water-courses by governmental authority, until this has been gradually attempted during the last century, and particularly the past thirty years, as we have seen in the preceding section of this chapter.

In the meantime the people in some quarters had become thoroughly wedded to established usage; their administration of streams by syndicates of irrigation and tribunals of waters gave them great satisfaction, and it interfered with no one else. Under the circumstances there was much that was good to be found in these institutions. So much so that Italy, long years before, and France more recently, had copied them. But in Spain there was for a long time a great opposition to them from certain quarters. The conflict was one of higher principle, as well as opposition to the mere practice of local government of streams. It was the conflict between monarchial institutions and republican principles: in the last century, the struggle between the government and the people; in the first part of this century, the struggle between the monarchial party and the constitutionalists; later, between the old tyrant Ferdinand and an outraged nation; then, between the Carlists and the liberals; still later, the struggle between the *Moderados* and the *Progresistas* in the politics of the country; and, finally, in this last contention, local self government in irrigation has, to a certain extent, been conceded. In this the party of "progress" has been joined by the party of "moderation."

The south and southeast of Spain, where irrigation has been practiced, and where local self government in irrigation has grown as a custom, has always been the hotbed of democracy in the politics of the country; while the north and west, where cattle and sheep raising, grain growing, and manufacturing have been the prevailing industries, and irrigation has not, until late years, been much practiced, have equally been the stronghold of the monarchial party. The sturdy Biscayan, the selfish Basque shepherd, the fierce warrior of Navarre and of the Asturias—all mountain dwellers of the north, and not irrigators—with the austere Castilian of the central plateaus, the energetic Leonian and the warlike Aragonian of the great northern valleys, were the deliverers of Spain from the infidels—driving them south and east, off from the peninsula; and since then, amongst the descendants of these patriots, have been found the major part of the supporters of the throne; while the "witty, flippant, gallant, bull destroying Andalusian" of the southern valleys, the swarthy, industrious, treacherous Valencian, and his cousin of Murcia, on the east coast—all irrigating people—occupy the country whence the Moors were last driven, and have ever furnished the greater proportion of ultra

progressionists in the politics of the nation, and been the most intractable and unsubmissive to central government.

May it not be that Spanish politics and the destiny of Spain have been influenced far more than the Spaniards themselves generally suspect by the concessions of streams and privileges of self government in irrigation matters, which these people of the south and east received from the early Spanish kings, to make them contented and keep them quiet in their retired quarter? Has not this local exercise of self government, and freedom from official restraint in the pursuit of their peculiar industry begot anew, bred, and forwarded that sentiment which has spread through Spain as the constitutional spirit, which now dominates the country, and has circumscribed the power of the throne? Has not the control of the country by the people been hastened by the early control of water-courses by them in some quarters?

During the last century, several governmental attacks on the irrigation administrative system prevalent in the eastern provinces, were made. The people of other quarters wished to adopt the system of local self government, and establish "tribunals of waters," or "juries of irrigation;" but the government held that the town authorities were the proper local administrative bodies for community irrigations, and that special courts of waters were incompatible with the national judiciary system. Attempts were even made to abolish the water court of Valencia—the parent of all the institutions of this kind—but these failed, as we have seen.[1] Then came the time when the opposition gradually ceased. This was through the period heretofore written of as that of early constitutional development. Following on has been a term when the principles of constitutional monarchy have been apparently victorious in Spain, and with their triumph has risen and been adopted, as a part of the national law, the principle of local self government in irrigation.

Not only the antecedent political influences and tendencies spoken of, but also the material necessities of the country, have directly contributed to this end. All parties have recognized the great necessity of advancing agricultural interests, and each has striven to encourage irrigation. But *system of control* there had to be of some kind, and no party was long enough in power to build up a central administrative department, as the French had. Hence,

[1] See, pp. 395–398, *ante.*

actual necessity of doing *something* to bring order out of chaos in many old irrigation districts, and to admit of the carrying out of new enterprises, may have forced the acceptance of the Valencian plan of local administration of waters, to be applied where desired or necessary. That this plan was popular, was all the more reason for the general acquiescence in it by political leaders. But we may well understand that it was heartily adopted by the chief figures in the political field during the time of which I have just written; for the *Progresista* leader was Espartero, a man who really devoted himself to the material advancement of his country, and who spent years of his life in agricultural pursuits; while Narvaez, the leader of the *Moderados*, was duke of Valencia, and from the irrigated quarter of Spain.

Ancient Custom and Modern System.[1]

The primary outcome of irrigation development in Spain, in the matter of administration, could hardly have been encouraging for the cause of self government. Speaking of the times in Valencia before the remodeling of the regulations of which I have written in chapter XVII, Aymard wrote: "There is but one word which will describe the ancient state of affairs in irrigation administration, and that is, *anarchy*."—[p. 34.] In another place he speaks of the condition of affairs in Granada in the following terms: "Contrary to that which has happened in other irrigation centers of the peninsula, things have here remained exactly as they were in the year 1492, at the time of the conquest. * * * It were vain to seek for positive administrative principles in the midst of the confused regulations that characterize these irrigations."—[p. 264.

Continuing, and after speaking of the absence of regulations and administrative organization at Granada, this author remarks the fact that there is no apparent confusion in the apportioning of the waters, and explains this by showing that the water supply is abundant for all, and, hence, that conflicts do not occur, and in further explanation, he says:

"To understand how even now the irrigations are made with regularity, but without general supervision, we must remember that for several hundreds of years the division of water, crude though it be, has remained the same, that the rights of each water property have become as the bounds of the lands themselves. But

[1] See, Aymard, Chaps. II and XXI.

if we recur to the times when these irrigations were being developed, we are amazed at the bare thought of disorders, encroachments, and violence of all kinds that must have been in this place, without any definite principles of administration.

"It is apparently believed by everybody that the Spanish conquerors of the Moors only applied the institutions of their predecessors in matters of irrigation; that the honor of their creation belongs to the Moors; that Spain actually did nothing but inherit a splendid heritage, by which she benefits. * * * But we must reflect on the continual improvements that have been in progress all over the country; on the crude ways yet to be seen at Granada. In every century, regulations have been repeatedly revised; and everywhere, in spite of the diversity of fundamental principles, a methodical administration has been obtained, regular, strong, and concentrated. Does this honor belong to the Moors or to the Spaniards? The example of Granada leaves no doubt in our mind on this subject. We find there undisturbed the institutions practiced by the Moors themselves. The work of Loaisa, written but a little while after the conquest, largely by dictation from the old tillers of the soil, may be considered as a photograph of the irrigations practiced by the Moors.

"It becomes possible, therefore, to make a sort of comparison between the irrigation institutions of the Moors and of the Spaniards. On the side of the Moors, there is nearly a complete absence of first principles of regulation; not any unity, not any centralization, hardly any policing, divisions of waters made without fixed plan, surely there was a time when there was anarchy prevailing. If this anarchy has ceased, it is because the disorder itself, ungoverned by a powerful hand, has become orderly by a long lapse of time.

"But this is not the sign by which we recognize good institutions. Such institutions should be good from the first, without the aid of time, without support of power; they should be susceptible of assuring regular working from the start. The systems of Valencia, Alicante, and Murcia, reformed and gradually made anew by the Spaniards, would do this. The system of the Moors, preserved at Granada, would not.

"But we must be just to all. Without doubt the Moors irrigated before the Spaniards, but to these latter incontestably belongs the greater part of the honor of those institutions of administration that are admired to-day."—[Aymard, pp. 269–271.

Having traced its development, we may now to advantage examine the system of local government in irrigation, itself.

SECTION III.

Irrigation Communities.[1]

Governmental Policy—Water-Rights.

The Spanish governmental policy contemplates the joining of all public waters available for irrigation with the lands which they may irrigate, and their management by the owners of the lands—individually, or as organized into communities. Accordingly, as we may have seen, the conditions under which water privileges are issued are in all cases such as ultimately result in the union of the water with the land, and, as we will presently see, the formation of communities of irrigators is made compulsory in a very large range of cases. Thus, the law provides for the granting of water privileges: (1) to individual proprietors, for the irrigation of their own lands; (2) to several proprietors collectively, for the irrigation of their estates; (3) to organized communities or associations of proprietors, for the lands of their members; and, (4) to individuals and companies or other organizations, for distribution to the lands of others. In the first three cases the water-right is directly attached to the certain lands of the persons receiving the privilege or interested in the organization; while in the fourth case, although the water privilege is temporarily the property of the grantee, such concessions are only for limited terms, at the expiration of which all works and rights pass to the land owners, organized as a community of irrigators.—[Article 188.] Thus, in every case of new irrigations with public waters, the ownership of the water-right is, ultimately at least, to rest with the land owners; and this has been the general policy of the various governments of Spain for over a century, and, perhaps, much longer. But during a greater part of this period the principle of local self administration of these rights was not encouraged by the government. Now, however, this also is part of the general law, and applicable where desired by the people or thought necessary by government.

Governmental Policy—Association.

Such being the policy of the government in placing the public waters available for irrigation, under the control of those who may

[1] See, Bentaból and Ureta; also, Pardo, laws and regulations cited.

so use them on their own lands, it supplements this step by making obligatory the organization of these utilizers into societies or associations, the outline of whose formation and management it prescribes in its laws and regulations. Following generally the terms of the law of 1866, and of regulations which preceded it, the law of 1879 provides that when twenty or more irrigators are served under one water privilege, and the area of their lands thus irrigated exceeds two hundred *hectares* (494 acres), or when, in the opinion of the governor of a province, "the local interests of agriculture demand it," "a community of irrigators shall necessarily be formed."—[Article 228.] But, notwithstanding these provisions, proprietors whose lands are irrigated with waters diverted before or after those of the community, cannot be compelled to join or stay in the association, but may form a society for themselves alone and make their own regulations.—[Article 229.

Thus, in irrigations already existing, except in the cases hereafter to be mentioned, when the number of irrigators exceeds twenty, and their irrigated lands are jointly more than 494 acres in area, the law makes it obligatory on them to organize an association according to its terms and those of the ministerial decrees under it. If they should not do so voluntarily, the governor of the province will order it done, and a failure to comply with such order will work an impairment of the water privilege. The government makes this a condition of the use of public waters by a number of persons jointly, whether the rights to water had accrued before the passage of the law or not. The rule is based on the police power of the government; and accordingly we find the chapter on the organization of associations, with the provision making compulsory the formation of associations, placed in the law, under the title of "The Police of Waters." And with it is coupled the declaration that the police of the public waters shall be in charge of the administration, and that the minister of public works shall dictate the necessary general regulations for their use and employment.—[Article 226.

When the number of acres does not exceed 494, and when the number of irrigators does not equal twenty, in any district served with public waters under one privilege, the law generally leaves the question of the formation of an association to the decision of the majority of the irrigators representing a major part of the land irrigated, and if such majority so determine, it must be formed; but even if the majority determine in the negative, as the excep-

tion to the general rule, should the governor of the province consider that the interests of the local agriculture demand it, he may order the organization to be made.

But, in the compulsory formation of communities for joint utilizations of public waters which existed before the passage of the law, as the exception mentioned in the second paragraph preceding, article 231 says that districts "which have hitherto had a special system embodied in their ordinances, shall continue under the same as long as a majority of those interested do not wish to modify it, subject to that which is prescribed in the present law, and without prejudice to the accomplishment of that which is arranged in article 190."

That is to say, where there is a *systematic* organization and management already in a community, and where this system has been embodied in the form of a written ordinance, until the majority of those interested desire to make a change, it shall be adhered to; but (consulting the article, 190) such perpetuation of existing organizations is not to be construed as authorizing and confirming uses of waters, which by examination and gauging may prove to be extravagant.

Thus, the systems of management, which we have traced in former chapters, as developed in the Valencian and Murcian districts under customs of very very long ago, and as remodeled in later years under special governmental decrees, and also other forms of organization and management resting on custom or early grants of right—some analogous to the present prescribed form and some totally different in principle and structure—exist at this day all over Spain. But many changes from the more primitive forms of organization to those upon which the provisions of the new laws were based, had been made during the half century prior to the passage of these laws, and reorganizations since have been more numerous, so that the tendency thus is strongly to a uniform system of irrigation management throughout Spain. Moreover, the greater irrigation enterprises of the country have nearly all been inaugurated since this renaissance in irrigation organization, so, it may be said, that at this day the administration of irrigation affairs in all the larger districts of the country is based upon principles similar to those embodied in the general law of waters.

Such being the result of past policy, and the effect of the law on irrigations already existing, as we may suppose, water privileges now directly issued for the joint benefit of a number of irri-

gators are granted to them only as associated under the law, in all cases wherein the government thinks such an organization should be formed. It is only, then, in cases wherein the number of proposed irrigators is less than twenty, and the area to be irrigated is less than 494 acres, that a water-right for a joint utilization can be had on any other terms, and even then the government must be satisfied that due provision is made for the economical use of the waters and harmonious working of the management, else it arbitrarily orders the formation of an association.

Even when a water privilege is issued to a company or individual for sale, rental, or distribution of waters to the lands of others, an association of the consumers is immediately formed under the law, the details of distribution of the waters is committed to its charge, and, as before written, it falls heir to the works and privileges at the expiration of the stated term of the concession.

The Principles of Association.

The general principle of organization is that of a representative government, the forms being prescribed in the law and the details in the regulation under it. The model in outline and leading principles being thus made compulsory, the details of organization and of the ordinances and community regulations are left to the discretion of each association. The principles advanced by law are those of the local developments already written of, and the forms prescribed by the law and regulations are based upon the best examples from practice, in the light of half a century of experience in revising those of ancient times.

The law expressly accords to irrigating communities the power of fixing the qualifications of their electors and of those eligible to office; the proportioning of votes to land ownership; the times and forms of elections; the terms of office; manner of counting votes and conducting proceedings of the assemblies. It provides that every community shall have an elective governing body, to be called a syndicate; that the number of members of this body may be fixed by the community, considering the extent of the irrigations, the number of main distributaries employed, and the number of irrigation centers or towns supplied; that the service of the members shall be rendered gratuitously, and that on election the individual must serve for at least one term.—[Articles 230, 231, 232, and 239.

We here find the principle of compulsion applied not only to the formation of associations, but to the acceptance of office under such organization. It reaches not only the irrigators collectively and forces their action, but also each individual and makes obligatory his gratuitous service in the administration of the local waters and irrigation under the law, if he be selected by vote of his associates.

Although the communities are expressly given power to frame their own ordinances or regulations under the law and administrative models, they are, yet, directed to submit these for approbation to the government authorities. The minister of public works may accept them, and, if not appealed from, such action will be final. The council of state may refuse to advise the sanction of an organization which in its judgment is not made in accordance with the terms of the law, or which materially differs from the administrative models; and on such advice the minister may reject it, and the community will have to be reorganized.—[Article 231.] In this feature of the law we find the provision which compels uniformity of organization, in all essential points, throughout Spain.

The general assembly of the members is the source of power and the supreme authority in the community, and all irrigators and users of water within the district are eligible to membership. The regulation directs that at the first meetings for the formation of an association, and before it has adopted its ordinances, the voting shall be done according to area of lands which each participant represents, but all have an equal voice in the proceedings. This provision really puts the stamp of landed qualification on the whole organization, for, although the assembly may fix the status of the individual vote as it chooses, it is not likely that the larger proprietors in organizing will altogether sacrifice their advantage. The practice, apparently, results in a compromise on this point, so that, in the ordinances examined, the vote is accorded to certain units of ownership, in such way as to limit the proportionate voting power of the larger owners.—[Articles 239 and 240.

While the law allows much freedom in the organization of associations, on the important points of electoral qualification, representation, and voting, the number of members in the governing syndicate, etc., there is yet a limitation on this independence, provided to make certain of equitable distribution of membership. It is found in article 236, and insures to the lands last receiving water

in a district, and to each of the several centers of irrigation or separate interests merged into the community, their due representation in the board of control. It is an essential part of the organization, made necessary by the spirit of the law as well as the letter of ministerial instructions, to keep the census of individual irrigators and the records of water use constantly up to date, and to reapportion representation in the syndicate in accordance with these data, applied under the rule, whenever it may become necessary. Failure in this would result in appeal to the government, and the administration would perform the duty if the community authorities refused to act.

Revenue—Protection—Control.

The law seems carefully to have avoided details in its provisions concerning community revenue and expense, the sole check on free action being that all expenses shall be borne "by the irrigators in equitable proportion." Thus, there are plans of assessment and tax levying which might be considered equitable in one quarter which would not be so considered in another. We have already seen that very great variation in this respect existed in the older irrigation districts of eastern and southeastern Spain; and the fact is that newer ordinances show examples of revenue systems of every variety, from that based on simple measurement of water used, without reference to land ownership, to that based simply on area of land ownership without reference to area irrigated or amount of water used.—[Article 233.

While the law is most careful to guard existing interests within communities as well as without, it has not overlooked the fact that obstinate inaction and illiberal spirit, as well as absolute inability on the part of some individuals to join in an improvement, may often be present, and prevent the carrying out of the best and most promising improvements, if there is no way of avoiding such negation. Hence, we find a clause which enables some irrigators of the community to carry out works or to enlarge those existing, at their own exclusive expense, and to fully profit by their enterprise, provided they obtain the consent of the community as a whole.—[Articles 233 and 234.

Although, in the main, irrigation communities are the complete owners of their property—even of the water power which the flow in their canals may afford—the law is ever vigilant to insure the

full measure of benefit being derived from the public waters; and if a community does not utilize the power which the waters in its channels may be caused to produce, the administration, after due notification and formality, may grant the right of such use to other parties.—[Article 235.] There can be no more conclusive proof than this of the complete control which the government really reserves over its waters, even though it does leave the details of their management to local communities of irrigators.

Forming Irrigation Communities.[1]

Although the law, as we have seen, compels the organizing of irrigators into associations, and prescribes the general form and principles of such organizations, it does not make the initiation and conducting of the proceedings an administrative power or duty, except in those cases wherein the governor may order such formation, or in the cases where the *alcalde* may be called upon to inaugurate a movement, as we shall next see. It appears to be the policy to leave the proprietors as free to act as possible under the law and regulations. They are supposed to know the law and the terms of using public waters, and to be disposed to comply therewith.

The law is silent upon this subject, but the ministerial circular of instructions under it enters into details substantially as follows: In cases where it is desired or necessary under the law to form an irrigation association the movement shall be commenced by the proprietors collectively, or, in default of this, the *alcalde* of the town in whose jurisdiction the lands lie must call a meeting, giving at least thirty days' notice in the most public manner, to all those interested in the utilization of the waters in any manner, within the proposed district, setting forth the object and design, time, and place of the proposed meeting.

This general convention or assembly of interested persons, must determine the basis of the proposed organization, upon which its constitution or ordinance and regulations are to be framed, and appoint a committee of its members, to put its wishes into form according to the model prescribed in the ministerial circular, and also to draught regulations for the governance of its proposed syndicate and jury or tribunal of irrigation. This committee reports at a subsequent meeting, where, at one or more sessions, the prop-

[1] See, Ministerial Instruction, June 25, 1884.

ositions of the committee are discussed. Before the final adoption of the ordinance and formation of the community, it is necessary, however, to give another public and general notice, according to the prescribed official form, by publication and otherwise, summoning all land owners to appear at the meeting where the final steps are to be taken. The actual presence of the owners or legal representatives of more than half of the property to be included in the community, is necessary to make the meeting valid; and if such majority is not present, another meeting must be called. At these preliminary meetings the voting must be conducted upon the basis of the unit of area of land ownership—that is, by *hectares* or fractions represented. If it is a question of the formation of the association, and in a case wherein the law does not make such formation obligatory, there must be a majority of land in the district voted in the affirmative, in order to so decide it. If a question of simple adoption of an ordinance or regulation, the vote of a majority of the property present is sufficient for adoption. Thus, there being a bare majority of lands in the proposed district represented, and a bare majority of that present being in the affirmative on the adoption of the ordinances, such law for the whole district may be adopted by a vote but little in excess of one fourth of the interest involved. But the proper notice having been given, it is considered to be the fault of those who have not attended, that they have no voice in the matter, and so the result must rest until changed in the manner prescribed for such remodelings in the ordinance adopted.

Having thus organized, a copy of the proceedings in full and the ordinances adopted must be deposited in the office of the municipal council for a term of thirty days, and the fact must be officially advertised, so that all may examine and become acquainted with the project and results of the meeting. After this time the ordinances and copies of all proceedings in duplicate, duly certified and attested by the officers of the assembly, are sent by the chairman to the governor of the province. Accompanying these documents must go copies of all objections or protests which may have been filed, and plats illustrating the whole subject.

The governor of the province must successively consult and obtain the opinions of the provincial board of agriculture, industry, and commerce, the chief civil engineer of the province, and the provincial committee, upon the proper outlining and other points

relative to the formation of the district and association, and these, with his own report, together with all the papers received by him, he must send to the minister of public works for his approval. The minister may approve, and thus end the whole proceedings by sanctioning the formation of the association, but in case he does not approve, the matter must be brought by him before the council of state, by whose advice only can the approval of the ordinances of an irrigation association be refused.[1]

SECTION IV.

Community Administration.[2]

Ordinances of an Irrigation Community.

Under authority and by direction of the law, the minister of public works has, from time to time, issued instructions concerning the general form to be followed in the organization and government of communities of irrigators. The last circular of this kind, dated but little over a year ago, is specially complete and exhaustive of the subject. Having, without doubt, been based upon the best results of all accumulated experience, it probably embraces the features and forms found to be generally desirable and advantageous. This circular is in five parts: (1) an instruction concerning the steps to be taken in the forming of irrigation associations; (2) a model form upon which to draw ordinances for irrigation associations; (3) a model form upon which to draw regulations for syndicates of associations; (4) a model form upon which to draw rules for the government of special courts of irrigation; and, (5) a model for the formation of central syndicates on streams where there are several organized communities of irrigators, each with its special syndicate. The first of these instructions has served as the basis of the paragraphs which hereinbefore appear under the heading, "Forming Irrigation Communities." On the others, together with certain articles of the general law, is based that which follows in this section.

The model forms of ordinances and regulations themselves first demand notice. They are annexed, for the most part in mere out-

[1] Royal Order; Administrative decision.
[2] See, Bentaból and Ureta; also, Pardo, laws and regulations cited.

line, to appendix III. It is difficult to think of anything of this kind more complete than are the originals of these documents, for every point appears to have been foreseen and provision made to meet it; but when we remember that they embrace the collected results of long experience and of very many examples, we need not feel surprise at their apparent perfection. It is a significant fact that so much care should have been exercised by the government in framing these models, and it is the strongest evidence that, while virtually leaving the details of irrigation administration to the irrigators, the government recognizes the necessity for and proposes to exact uniformity in organization, and to retain the general control itself.

Composition of the Community.—Taking the general model ordinance as a basis of what follows: under this heading we find in twenty articles, provision made for the declaration of formation and nomination of those participating in the community; a description of the lands, improvements, and works; a description of the water-rights, sources, and courses; a declaration of the object of organization, and of the fact of individual agreement to it; stipulations with respect to withdrawal of members and of entry of new members; specifications with respect to community obligations and powers, and the same with respect to the rights and obligations of the individual irrigators and of other users of water who are members; a declaration concerning promptness in payment of assessments, and nomination of penalty for delinquency, and provisions with respect to the officers, their qualifications, terms, gratuitous and compulsory service, etc.

The object of forming an association and the engagement of members to observe its ordinances, as expressed in Article 5 of this model, constitutes the key to the entire Spanish system of irrigation administration. Substantially and almost in plain terms it says: As the result of centuries of experience in Spain it is found that the diversion of waters from streams and their use in irrigation is a most fruitful cause of quarreling and litigation, and so continues to be wherever proper organization and government has not been effected. This evil is one of such magnitude and so harmful to the general interests, although but a small part of cultivated Spain even is irrigated, that the government feels called upon to stop it. To this end four things are necessary: (1) Local organization for constant administration of waters; (2) uniformity of general plan amongst such organizations, and accountability to

a central authority; (3) engagement on the part of irrigators to accept such rule and to keep their differences out of the courts—to submit them to summary arbitration by tribunals specially elected for the purpose by themselves, rather than involve them in protracted litigation before courts not so chosen or fitted; and (4) establishment and recordation at once of the actual and relative rights of water users, as a guide and basis for their administration, so that individual rights may be known and respected; and because of the necessity for this, the law has been passed and this model is promulgated.

Article 6, following in this line, adds force to the implied argument of necessity for organization and submission of individual interests to general welfare, and the inviolability of the compact: irrigators who have become members of a community can not be permitted to withdraw at will. Their act of association must be a compact binding them, on pain of forfeiture of their rights to water, to remain as members and be governed by the will of the majority, as expressed under their ordinances. And, conversely, irrigators or land owners who have not come with others into an association, can not afterwards be permitted lightly to demand entrance, and thus disturb the settled régime of affairs. If there was sufficient reason for them to stay out at first, it is to be presumed that there remains sufficient reason for them to keep out, and, in this view, their entrance may only be attained upon the expressed will of a majority vote in the association as formed.

Taken in connection with the compulsory formation of associations, already commented upon, this reasoning is very significant. It completes the story of the whole system: system and administration there must be; and it must not only be uniform, but it must be settled and stable, and not easily disturbed.

But from article 8 it would appear that while rigid, and inviolable though the system must be, in the details of application it must equally be flexible, else it can not be adopted without hardship in many cases, because of great variation in established conditions. It would appear from this article that in neighborhoods covered or likely to be covered, even by only one community, there are found established utilizations of water whose bases of individual right differ—some being by volume of water, others by time of flow, others by area irrigated, etc.—and that it is necessary to admit each irrigator upon the basis to which he is accustomed—the recognized basis of his rights; or, at any rate, that uniformity of

terms of association in this particular is not so essential to the success of the system as a whole, as to require the adoption of one rule or basis of individual interest to be insisted upon everywhere.

Still another principle specially worthy of notice we find recognized under this heading—that of compulsion upon the individual member promptly to meet his engagements to the community. Article 9 of the model ordinance is most direct and sweeping on this point. The irrigator who enters an association under it signs a contract, and pledges his land as security, that he will promptly pay his assessments, or suffer an additional charge of ten per cent per month for time of delinquency, and at the end of three months will forfeit his water if not paid, and that all expense accruing from the proceedings shall be equally a charge against him, subject to summary collection, and without power of appeal to any tribunal other than the special jury of his district.

Herein we find the same appreciation of the point essential to success in irrigation enterprise, which has been before repeatedly remarked—the necessity for promptness of decision, the cutting short of all disputes, the suppression of grumbling, the rebuking of individual inaction, and the summary dealing with individual participants in the common benefit.

Works of the Community.—Under this heading in the model ordinance, we find a declaration to the effect that there shall be made, and constantly kept posted, a complete descriptive schedule of the works of the community, and another schedule of all works forming part of the irrigation system, which may be the property of private individuals and which should be maintained at their cost and responsibility. This provision, contained in articles 21 and 23, shows very clearly, as is the fact, that in Spain, as elsewhere, grave troubles and complications frequently result from the want of complete plans and descriptions of works made clearly of record and kept readily accessible. Managers, constructors, and owners of works are changed or pass away; knowledge of much which is familiar to them concerning the works, and trivial though each item may be, is lost with them. Then trouble succeeds. The width of a canal is not of record; the original grantor of the right of way did not care how wide it was made. But now its margins have been built on; land and improvements are valuable. It cuts out its channel from some cause, threatening these improvements; or its owner desires to widen it, and claims the privilege so to do under the old right of way. There is no sufficient

record of what was the width of the work, or what it was intended to be. Litigation follows; and more is spent in one such lawsuit than proper plans and descriptions of the works would have cost several times over. This is but one of hundreds of cases which rise out of insufficient plans of works in old regions, and the Spanish government has carefully guarded its irrigation communities from trouble on this score, as may be seen by reading the articles cited in its model ordinance.

Exercise of excessive authority on the part of boards of control or other executive officers in charge of great common properties like the irrigation system of a community, is another point which this Spanish model ordinance seems to have guarded. A syndicate may order studies and plans of new works, but only the community in general assembly has the power to adopt such plans and order the construction of the work, and a tax levy for a work not thus ordered can be resisted by any member of the community. Even as to the matter of cleaning the works, there is a distinct understanding placed in the ordinance, so that certain cleanings annually are had, and the syndicate has beyond this certain discretion for additional cleanings, but up to a defined limit only.—[Articles 22, 24, and 25.

As the power of the syndicate is limited with respect to the works, so are the privileges of the individual members clearly defined. No one may do work on any canal or structure without authorization; nor, even, may the owner of the margins of a canal use them except under guide of specifications in the ordinance limiting the character and scope of his utilization.—[Articles 26 and 27.

Of the Use of Waters.—Under this heading is found in the model ordinance a declaration of individual rights to water, on the basis of the measure of individual interest in the community, determined under a former article, the order of use or schedule of turns by which water must be distributed to different individuals, quarters of the community, or main distributing works, as the case may be, instructions concerning the distribution of water by the authorized agents of the community only, and a declaration that no irrigator need expect preference over his associates because he has chosen to cultivate a crop which may need water more than do theirs.—[Articles 28–32.

Of the Lands and Manufactories.—Attention is specially directed to articles 34 to 36 of the model ordinance, and under the above

heading. In providing for plats and schedules of lands irrigated or irrigable, and establishments served with water, as is done in these articles, and requiring that they be constantly posted to date, the Spanish government has attested the existence of an experience in Spain which all familiar with irrigation community development under any system are prepared to appreciate. The absence of proper plans of lands and neighborhoods served is almost always a source of trouble, extravagant service, and waste of water; the manager of works is at sea without a chart when he has no plan of his district, as many are now beginning to appreciate to their sorrow in this country. It is to be noted that the Spanish model ordinance is very full and explicit in its provisions under this head.

Of Offenses, Indemnities, and Penalties.—Articles 37 to 42, under the above heading, are of interest because they illustrate the working of the special water court, a most important feature, hereafter referred to under a special heading

Of the General Convention or Assembly.—The articles 43 to 57, under this heading, are most important, but their matter is relevant to that under a former subdivision of this report concerning the "Principles of Association," and should be read in connection therewith.

Of the Syndicate.

The administration of irrigation community affairs under the Spanish system is distinctly separated into two branches—the executive and the arbitrative or judicial—which are represented by the syndicates or boards of direction, and the juries or boards of arbitration.

Article 237 of the general law of waters [see appendix III], very clearly defines the general powers and duties of the executive arm of the administration, and in this connection attention is first directed to it.

Articles 58 to 66 of the prescribed model ordinance for communities [annexed to appendix III], quite fully explain the organization of and representation on such boards, and the qualifications, distribution, and service of members thereof; and on these points these articles should be here consulted.

Finally, the prescribed model for regulations to govern a syndicate [also annexed to appendix III], enters fully into details on

all the points upon which the law and general ordinance touched, and contains other matter worthy of attention.

In view of much that has been said elsewhere in this report on the subject of syndicate boards, and with the above cited matter at hand for reference, it is not necessary at this point to enter into the subject further than to remark that in Spanish practice it is considered a great honor to be elected a member of the syndicate of one's irrigation community, and that the contaminating influence of party politics rarely finds entrance there.

Of the Jury of Irrigation.

The general law of waters devotes the second section of its chapter XIII (articles 242 to 247) to juries of irrigation—the arbitrative branch of its administrative system for communities. We therein find this feature as a necessary part of the system, and its adoption made compulsory. This is surely a great revolution from the few years ago when, as we have seen, the government declared against such special courts as organized locally in Valencia and Murcia, and put every obstacle in the way of these examples being elsewhere followed; alleging that the system was opposed to the integrity of the judicial system of the country, and not possible to be linked therewith, or at all tolerated. We are not to suppose that this change in sentiment and policy towards special water courts, however, is altogether due to the change in form of the Spanish government and the spread of liberal principles, or that it is even, to any great extent, directly a result thereof, for the true explanation of the change is in the fact that the water courts were formerly opposed because of misapprehension on the part of the ruling powers of the necessities of irrigation in this respect, and of the real nature of the courts themselves. This is but an illustration of a fact which any student of irrigation history and development will find constantly recurring in the records of the past and experiences of the present: those who do not live in irrigation regions rarely appreciate the peculiar demands which this industry necessarily makes for special recognition in the laws of a country, and are seldom capable of conceding freely to it the simplest of its requirements, from the fear that some established right is to be invaded, or custom set aside.

The object and purpose of the jury of irrigation in the Spanish system, as gathered from the articles above cited, is: to have de-

cided promptly and inexpensively the thousand and one questions which arise in the distribution and use of water—to relieve irrigators of expense of litigation, and irrigation from its curse.

We find in the model community ordinance as prescribed by the administration, articles 68 to 72, devoted to the organization, etc., of such juries, the qualifications of their members and provision for a special regulation to more clearly define their powers and duties. And, finally, the model for the regulation itself leaves nothing to be supplied in explaining its working.

Of General Syndicates.

In this feature of the Spanish irrigation administrative system, we have the guiding principle carried to its extreme in application. Local government is herein applied to the management of the distribution of waters from natural streams to those who have rights therein. Article 241 of the general law (see appendix III) plainly states that "when on the course of a river several communities and syndicates exist, they may form for their mutual convenience one or more central or common syndicates, for the defense of the rights and the maintenance and protection of the interests of all; and it shall be composed of representatives of the communities interested."

Now, it is a most noteworthy point that this article virtually puts, if the government so elects, the control of distribution from natural streams into the hands of the representatives of such users of waters only as are organized into communities. It should be carefully noted that neither private or individual utilizers from a stream, nor companies or others engaged in the distribution of waters for sale or rental, are given any such privileges. In fact, were claimants of the several named classes located on the same stream, under the Spanish law the community representatives would control the division of the waters from it, to the exclusion of the individual or company claimants, whose protection would be had through the general administrative authorities.

Going further, the last paragraph of article 241 provides that "the number of representatives which may be nominated" to the central syndicate "shall be proportioned to the extent of irrigable land embraced within the respective boundaries" of the several irrigation communities on the stream. Thus, the proportion of control accorded is in direct ratio to the extent of irrigation sys-

tematized according to the prescribed governmental regulations. This is setting a high premium on irrigation enterprise by the owners of land, and systematic organization and self government by the irrigators, as against enterprise by companies or others who distribute water for sale or rental to the lands of others. But let it not be supposed that rights of this class are not fully protected. The government has chosen to allow representatives of irrigation communities, formed into central syndicates, to apportion their waters from streams to their communities, but the streams have not been turned over to them unreservedly. As a matter of fact, it is only by implication, and in cases where the government refrains from taking charge of the division of waters from the streams, that these central syndicates have any right of control over the waters in their natural channels. The law directly accords no such power. It simply says that central boards may be formed where more than one organized community derives its water from one source of supply, and that the purpose of the forming is "the defense of the rights and the maintenance and protection of the interests of all." Neither is there any direct mention in the prescribed model ordinance for communities, nor yet in the model regulation for central syndicates, of any power or duty connected with distribution of waters from the natural streams.

The second paragraph of the article 241 of the general law gives authority to the minister of public works, and to the governors of provinces, to order the formation of central syndicates "when the interests of agriculture demand it." From this we may infer, as is the fact, that the government has found it well to enforce local organization on a broader plan than that of the single irrigation community, in order to preserve harmony amongst users of water otherwise independent of each other, by providing means of intercourse, and of preventing and adjusting conflicts between them, of whatever nature, arising out of their irrigation practice.

And the ultimate fact is, that where such central syndicate is formed, whether voluntarily or under orders from the administration, the authorities leave to it the detail of management of the division of waters from the natural stream to the several communities according to their rights. But the government has sacrificed in no way its complete control over the streams, nor does it in practice leave them wholly to any local organization.

In conclusion of this subject, attention is directed to article 67 of the model ordinance for community organization, which is in

substance a mere repetition of the article already cited from the general law; and also to the model for a regulation to govern central sydicates, annexed to appendix III.

AUTHORITIES FOR CHAPTER XXI.

Bentaból and Ureta.—[Work cited as an authority for Chapter XIX.] See, headings "Attributes of the Administration," "Jurisdictions of the Courts," "Appeals," "Jurisdictions," and "Communities of Irrigators."

Pardo.—[Work cited as an authority for Chapter XIX.] See, general law of waters.

Aymard.—[Work cited as an authority for Chapter XIX.] See, Chapters II and XXI, and parts cited for Chapters XVII and XVIII of this book.

Cyclop. Pol. Sci.—"Cyclopedia of Political Science." By John J. Lalor; 3 vols., Chicago, 1884. See, article "Spain."

Amer. Enc.—"New American Encyclopedia." See, article "Spain."

Johnson.—"Johnson's Encyclopedia." See, article "Spain."

Martin.—"The Statesman's Yearbook" for 1883. By Fred. Martin. London. See, article "Spain."

CHAPTER XXII.—SPAIN(7);

GOVERNMENTAL POLICY AND IRRIGATION ENTERPRISE.

SECTION I.—*Past Promotion of Irrigation.*
Ancient Policy and Works, to 1759.
Commencement of Modern Policy—1759-1833.
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SECTION I.

PROMOTION OF IRRIGATION IN SPAIN.

Ancient Policy and Works.[1]

The construction of several existing works of irrigation in central and northeastern Spain has been attributed to the Romans. Others in these quarters are dated from various times during the eleventh to thirteenth centuries, and accredited to the Spaniards. But the greater number of works and most successful irrigations at that time, existed in the south and east quarters, and were the developments of the Moors.

During the early part of the thirteenth century James I of Aragon, taking great interest in irrigation matters, paid special attention to the management of the works throughout the province of Valencia, conquered from the Moors, and constructed there the

[1] See, Llaurado; also, Aymard.

Royal Jucar canal, whose administration has been described in a former chapter. It may be supposed that he had much trouble with these properties. The irrigators from the old systems fretted under the restrictions placed on them, and demanded control of the works, like, it was alleged, their ancestors had under the Moors. As we have seen (chapter XVI, *ante*), the canals and waters were finally deeded over to them by this monarch, they were left free to form their own administration, and it resulted that the Royal canal was, at a later date, given to the owners of its dependent lands, on somewhat similar terms.

This example was followed by the succeeding kings of Aragon, and also by those of Castile, so that the works found in almost every valley opening to the east and south of the peninsula were turned over to the irrigators under them, or to the municipalities within whose political jurisdiction they were situated, either to manage without interference by the general government, or upon some plan which divided the responsibility and authority.

These acts were generally confirmed by the first rulers of reunited Spain in the last part of the fifteenth and first part of the sixteenth centuries. During this same period were commenced at government expense, by Don Juan of Navarre, the royal canal of Aragon, and also that of Tauste, in the valley of the Ebro; and other important acts of encouragement to irrigation were authorized. Solicitude for the development of home resources continued through this and the following reign, but was cut short by the ambition of Charles I (1517–1557) for conquest and acquisition of territory in America. His successor (Philip II; 1557–1598) laid aside war and had the satisfaction of seeing completed in his day a number of large irrigation works, chief among which are the great stone reservoir dams of Alicante, Elche, Almansa, and Aranjuez. During the three succeeding reigns (1598–1700) Spain passed through a period of depression and financial embarrassment, and only a few minor works of irrigation were inaugurated. Following this (1700–1746) the desires of the first king of the house of Bourbon to obtain the good will of the people, led to a series of abortive attempts to carry forward work on the royal canal of Aragon.

Commencement of Modern Activity.[1]

It was not until the fertile reign of Charles III (1759–1788) that the government again gave a vigorous impulse to irrigation. During this reign the great royal canal of Aragon was completed, the two immense stone dams of Lorca were built (one of them being the highest in the world), the royal canal of Castile was in large part constructed, all at national expense, and other great and important projects were conceded, upon what were considered most liberal terms, to companies, associations, and municipalities. The last part of the eighteenth and first part of the present century again brought great embarrassments and embroilments in Spain, so that there was no other notable encouragement to irrigation, except that in 1788 the *corrigidores*, or executive magistrates of the towns, were instructed by royal order to do all within their power to encourage the use of public waters in irrigation, both by private enterprise and by community or municipal action.[2]

Before his accession to the throne, Ferdinand VII (1814–1833) made protestation of great interest in agriculture, and promised much for irrigation, but as he disappointed the constitutionalists by his overthrowing their work, so did he fall short of fulfilling the hopes of the votaries of general irrigation and liberal management of irrigation practice. Nevertheless, under his rule the Royal canal of Castile was considerably prolonged at government expense, the great canal of Castanos (Infanta) received governmental aid and was completed, and the canal of Urgel was pushed forward by the municipalities whose lands it was to fertilize. But, above all, "with the object of promoting agriculture," all municipalities, communities, companies, corporations, or private individuals who, in virtue of a concession from government, should bring dry lands under cultivation by irrigation, were promised exemption from any increase of tax thereon, over and above that previously levied on them in their dry condition, to the time of and for twelve years after their first full harvest following irrigation.[3]

[1] See, Llaurado, Aymard, and Wallis.
[2] Nov. Rec.
[3] Royal Decree, August 31, 1819.

Policy of the Moderate Constitutionalists.[1]

Next came the reign of Isabella, the period of constitutional development and supremacy, as sketched in chapter XIX, *ante*. Within this time the policy of government, in the way of encouragement to irrigation, took a final turn, from that of construction of works at national expense, to the direct subsidizing of irrigation enterprises. I first abstract the general laws of the reign, upon this subject.

By a law of 1849, all capital which might thereafter be invested in irrigation canals, ditches, or dams of derivation, in accordance with governmental permits, as well as the rents or incomes returned thereon, was declared exempted from every tax or impost for ten years after the completion of the works in each case.

The lands which should be irrigated by means of such works were in like manner exempted from any increase in tax assessment for the same period.

And these benefits were extended, also, to such capital as might be invested in works for the discovery of waters—as artesian wells or ordinary wells—under governmental authorizations, and to the lands irrigated by waters thus brought to the surface.[2]

In 1861 an appropriation of one hundred million *reals* ($12,500,000) was made by law, to be devoted to the encouragement of agriculture; but the movement was not made complete until 1865, when was passed a law prescribing the manner in which this money was to be applied. Under these directions two thirds of the whole amount was to be issued in loans, in sums to suit, to land proprietors who should use it in the construction of works to irrigate their properties; and one third was to be granted in subsidies to capitalized enterprises for the construction of irrigation canals and reservoirs, and drainage or reclamation works.

The loans could be made by ministerial recommendation and royal decree, without the necessity of further enactment of law, to land owners individually or as organized into associations or communities, upon terms prescribed in the law and under conditions set forth more fully in a general governmental regulation on the subject, and as fast as the money should be recovered into the treasury it was to be again available for like disposition.

[1] See, Pardo, Llaurado, and Wallis.

[2] Law of June 24, 1849, Encouragement to Irrigation and Servitude of Aqueduct; Pardo, p. 148.

The subsidies were to be granted in each case only by virtue of a special law of the cortes, sanctioning the proposed scheme and terms of the contract. In such cases the government voluntarily or by request examined the project, revised the plans and estimates, determined the proportion of the cost it would advance, or sum total of its subsidy, and then advertised the proposition for bids. The company or person, etc., who would undertake the scheme on the proposed conditions and allow the greatest rebate on the governmental subsidy was awarded the concession, and then the proposition was submitted to the cortes for ratification. Such subsidies were to be paid, in the case of irrigation enterprises: one third when the canal excavation should be finished; one third when all the main works were completed; and the other third after the distribution of waters should be effected.

Land proprietors might organize as companies to irrigate their own lands, avail themselves of the benefits of the law in the matter of subsidy, and then issue bonds to raise money for the works, up to two thirds the taxed value of their lands.

When the works were to be carried out by a company not owning the lands it might issue obligations under the general law of public works.[1]

By virtue of the general law of waters of 1866, all capital invested under it in works of irrigation was exempted from taxation forever. Grantees of concessions were authorized to enter upon the public domain and take thence, freely, whatsoever material might be obtainable there; and to enter upon private lands, by virtue of the power of eminent domain, and condemn to their use, in the manner prescribed by law, such property or material as might be necessary for the works. And there were other benefits and privileges less important than those above, but still material to canal constructors.

Lands brought newly under irrigation by virtue of such works were declared exempt for ten years after irrigation should be effected, from increase of tax assessment over their valuation prior to the commencement of the works. This was a benefit to land owners, which enabled them to offer some direct inducement to a company contemplating the irrigations, or which, in other instances, was calculated to encourage them to combine, themselves to effect the irrigation of their lands.

[1] Law of June 11, 1865; *Memoria*, etc., 1864–1866, p. 12.

In all cases, whether the concession was made to a company or to a community, all lands within the district were obliged to pay for water when brought to them, at the stipulated rates, or, failing in this, to sell their lands to the company or association at fifty per cent advance on their assessed valuations previous to irrigation. Should the company not choose to take lands at this rate, however, the owners might thereafter use and pay for water, or not, as they chose.

All concessions embodying the above benefits or any subsidy to companies were to be put up at auction, and sold to the bidder who allowed the greatest rebate on the benefits, to the government, and every grantee was required to deposit a sum equal to one per cent of the gross estimated cost of completed works, as a guaranty of his good faith.[1]

This law was continued in force until 1879, when was passed another upon the same model and containing provisions somewhat similar to the above, as we shall see hereafter.

In the matter of works, during this reign of Isabella, the most important were the completion of the Royal canal of Castile, which was intended for transportation much more than for irrigation, at government expense; the construction of the great Lozoya masonry dam and the canal thence for the water supply of the national capital and irrigation in its vicinity, chiefly by subscription or subsidy from the city of Madrid; the construction of the great canal of Urgel, in the northeastern quarter, by an association of land owners assisted by government subsidies; and, of the Henares and Esla canals, by the Iberian Irrigation Company—a corporation of English capitalists organized to operate in the construction of irrigation works throughout Spain, under the laws subsidizing irrigation enterprise. These are but a portion of the large enterprises undertaken in this time, while of small works there were very many carried out by private individuals and associations of land owners, who availed themselves of the benefits and immunities which the foregoing laws offered.

Liberal Policy of the Regency.[2]

Under the constitutional government and the regency of Serrano, and just prior to the accession of Amadeus to the throne, the

[1] See, *Memoria*, etc., 1864–1866, p. 14, *et seq.*
[2] See, Pardo, Llaurado, and Wallis.

cortes passed and the regent promulgated an important law concerning concessions to companies and persons for the construction of irrigation canals and works of water storage.[1] This law was continued in force during the succeeding reign and until 1883, and a large number of important concessions were made under it.

Its object was "the encouragement of the use of public waters in irrigation." All companies or individuals who should organize and carry out works under a concession embodying its conditions, to water the lands of others, were granted, by way of subsidy, the full amount of the increased tax revenue to be derived from lands irrigated, to a gross amount of 150 *pesétas* per *hectare* (1.21 dollars per acre). This payment to begin two years after irrigation commenced, and to continue until the amount was made up, and thereafter to continue three full years more by way of indemnity for interest on capital during the period of construction.

Those who availed themselves of this law were required to deposit in the Bank of Spain, as a guaranty of good faith, a sum equivalent to two per cent of the gross estimated cost of the entire system of works. During the course of construction this amount was to be paid back in installments proportioned to work done. In case of failure to carry out works, this deposit was to be forfeited, and the works were to be sold at auction for the benefit of the creditors and grantees. All works projected under this law for the irrigation of more than 200 hectares (494 acres) were to be declared of public utility and entitled to the exercise of the power of eminent domain.

Capital invested under the law was declared forever exempted from all taxation except a net income tax. All lands irrigated under the law were to be exempted from the stamp tax on the first sale or transfer of ownership made after their irrigation should be effected. Owners who carried out works for the irrigation of their own lands were allowed, as under the law of 1866, the exemption from increase of tax assessment for ten years; but, under the foregoing provision of this law of 1870, those lands irrigated by works of capitalized companies were subject to assessment without the above exemption.

[1] Law of February 20, 1870; Pardo, p. 260.

Study of Water Supply.[1]

In order to acquire information concerning the water supply of the country, and obtain data upon which to study the arterial drainage problems of the great river valleys where disastrous floods sometimes occurred, the government, in 1863, instituted an extensive hydrological study of the entire kingdom. It was ordered: that on the midstream pier of every road bridge constructed across the principal rivers and their affluents throughout the country, a gauge rod should be affixed; that records of the rise and fall of the waters should be made by readings on these rods, under the direction of the engineers of the provinces; and that for each province these should be brought together and recorded in an official book.

At periods of flood and of low water the flow was to be noted with special care. The approach of flood waves was to be observed and their progress studied, in order that danger might be foretold and warnings published.

The provincial engineers were ordered to collate the results of these observations annually, in tables showing the movement of the waters and the periods and volumes of high and low water flow, illustrating these phenomena by diagrams of curves representing the rise and fall of the waters, and to transmit the same with a report to the central board of engineers of public works; and it was ordered that the outcome of these studies should be digested and published every five years, together with discussions as to the causes and results of the various extreme phenomena of flood and drought. The expense of these observations was to be met with moneys from the general appropriation for waters, rivers, and canals, placed at the disposal of the minister of public works.

Pursuing the subject still further, and this time more immediately in the line of the water supply for irrigation, in 1864 the consulting council of the government civil engineering department was directed to formulate a programme which should serve as "the basis of a hydrological study of the great river basins of the Spanish peninsula, in order that, understanding them, the data relating to the quantity and elevation of their waters, and the minute details, as to the course of the streams, the height and character of their banks, their slopes, cross sections, and profiles

[1] See, *Memoria sobre las Obras Publicas*, 1864–1866.

may be at hand, and that the importance of having the mentioned data, in order to regulate the appropriation of waters and foster the interests of agriculture and the increasing industries of the country, may be realized."

Still again, in 1865, "to give a new and vigorous impulse to the hydrological studies of the territory of the peninsula," the country was marked out into ten hydrographical divisions, according to its topography and great water-shed areas; and the results of the study of its water supply and flood phenomena were ordered to be formulated according to these governing natural features.

In January, 1866, all local governments, and local and governmental functionaries whose duty imposed upon them, under the laws and customs of the country, the expression of opinion or regulation of actions relating to the appropriation of waters, were called upon to report to the central government, clearly and minutely, setting forth their views on the subject of the water supply and the opposition on the part of private individuals to the systematizing of water-right affairs, assigning the reasons for such opposition, for the guidance of the general board of public works.

The policy of government has steadily progressed in the line of the hydrological study, and there have been a number of decrees, orders, and circulars issued during the time from 1866 to the present, following up the commencement made as above, and a great amount of field work has been accomplished under them. So that now the water supply study has come to be a permanent institution of the country.

SECTION II.

Present Irrigation Policy of Spain.

Laws now in Force.[1]

All the water and irrigation laws and measures of the former reign, of which the last subdivisions of the preceding section treat, continued in force during that which followed and now just closed, until some of them were set aside by those yet in force. These latter are the general public works law of 1877, the general water law of 1879, and the law of irrigation concessions of 1883.

The law of 1877 systematized the matter of public works in ac-

[1] See, Pardo; also, Bentaból and Ureta.

cordance with the provisions of the national constitution which had been adopted the previous year. [See p. 436, *ante*.] By it public works are classed in two groups: the first, those of general utility, embraces roads, railroads, ports, lighthouses, great canals for irrigation and navigation, and works relating to the management, utilization, and police of waters, improvement of rivers, reclamation, and drainage; the second embraces buildings for the use of the state, a province, or a municipality. Within these groups are sub-classes of works, the exclusive charge of some of which is reserved to the national government, that of others to the provinces, and the care of others is accorded to the municipalities. The immediate control of works of a fourth and very large class of the first group, may, according to circumstances, be retained by the state, a province, or a municipality, or may be given over to private individuals, communities, or companies. Of this class are irrigation, drainage, and river works.

To the state is reserved the control of canals of irrigation and navigation wholly paid for with national funds, and all national river works; and also the prescribing or approval of measures of police and administration of the use of public waters and streams in all cases. The provinces each have administrative control of works of navigation and irrigation pertaining solely to their several territories and those paid for by their funds. And the towns control works for the supply of their people with water.

The state may accord to a private individual, association, community, company, municipality, or province the privilege of conducting any enterprise which would come under its control. A province may accord to individuals of either class of grantees named a privilege to carry out a work otherwise provincial. And, in like manner, a municipality may delegate its right of construction and immediate control of municipal waterworks. But neither the state, a province, nor a municipality can forfeit its right of ultimate administrative supervision and regulation of works and waters.

In conceding to others its right of construction and immediate management of works of its class, the state, a province, or a municipality may agree to assist in the work.

All general government works must be let by contract, as will hereinafter be explained.[1] The conducting of provincial and municipal works is controlled by laws of the provinces.

[1] See, Law of Public Works, Articles 74, *et seq.*

No money subsidy can be agreed to in a concession unless an appropriation for such class of expenditure shall have been embodied in the administrative estimates, and passed by the cortes; and each concession with a money subsidy or premiums attached has to be sanctioned by a special law after the auction of the concession and the preliminary agreement, hereafter to be explained, shall have been consummated.

The water law of 1879 repealed that of 1866, but left in force the public works act of 1877, under whose general provisions with respect to works, companies, concessions, subsidies, and exemptions, it prescribes certain details of governmental policy specially relating to irrigation, navigation, etc.

The law of 1883 relates exclusively to terms of concessions for and subsidies or other gratuities to irrigation enterprises. It repealed the law of 1870, and modified the public works law and the general law of waters in some particulars relating to subsidies, but otherwise left these two latter statutes in force.

Subsidies and Exemptions Offered.[1]

The public works law defines a subsidy as "any direct or indirect assistance from public funds." Which includes exemptions from customs duties on articles or machinery imported for construction, maintenance, or operation of works; exemptions or partial exemptions from taxes or increase of taxable valuations of works, capital, income, lands, or improvements; power to collect rates for which a direct return is not made; contributions of money; and gifts of lands; all of which forms of assistance governmental action has at times extended to irrigation enterprise.

Special exemptions in the nature of subsidies, to authorized constructors of canals of irrigation, are found in articles 194 and 198 of the general law of waters; and subsidies of the same class are offered to owners of lands who themselves construct works for their irrigation, in articles 195 and 199. It will be noticed that these subsidies are similar to those offered by the law of 1866, already abstracted.—[See appendix III.

The law of 1883 says, that the state may help in the construction of canals and reservoirs of public interest, which require special authorizations, when the volume of water to be furnished by them is at least equivalent to a continuous flow of 200 litres per

[1] Same reference as for preceding subdivision.

second. The assistance will consist of a money subsidy not to exceed thirty per cent of the estimated cost of the main works and principal distributaries, including dams or other structures for storage, control, conducting, and letting out the water; and, furthermore, in a premium not to exceed 250 *pesétas* for each litre (1,415 dollars for each cubic foot) per second of continuous flow that the canal or reservoir can furnish in irrigation. But in no case may the total amount of subsidy exceed forty per cent of the actual cost of the establishment of the irrigation, plus one hundred *pesétas* per hectare (8 dollars per acre) of the land irrigated. And the government reserves the right to expend under its own immediate management, the moneys of the first named subsidy on such of the works as may be considered specially difficult of construction.

The subsidies proper are ordinarily to be paid by installments upon the completion of certain sections or divisions of the works, in proportionate parts of the whole, as shall have been agreed upon and stipulated in the articles of concession. The premiums are to be paid as the irrigation is actually effected or water delivered for the purpose, within maximum limits per year which may have been previously fixed in the concession, and in no case may the amount in any one year exceed the fifth part of the total of premiums due to all irrigations under the work.

Neither increase nor reduction in the cost of a work, resulting from modifications in its plan, notwithstanding official approval, can change the amount of its subsidy, unless its delivery of water shall have been augmented or diminished. In this case the subsidy may be made proportionately more or less.

By special understanding and arrangement an enterprise may be subsidized, not only by the state, but also by a province or a municipality or both.

When communities of irrigators, constituted according to the law of waters, wish to construct canals or reservoirs to irrigate their lands or to improve their existing irrigations, whatever may be the quantity of water delivered, agreeing in due form to defray one half the expense, according to a scheme officially sanctioned, the government will grant the concession to them, and will subsidize the enterprise to the extent of 50 per cent of the estimated cost of all main works. The subsidy will be paid by the governmental execution of a proportionate part of the works, choosing always those the most difficult and important.

Moreover, the government will advance to such community, as a loan, 50 per cent of the cost of secondary canals and of community distributing ditches, and of the preparation of community lands for irrigation. The amounts thus advanced, to be regained, with 3 per cent per annum interest, by a tax on the lands irrigated, fixed and agreed upon at the time of the concession.

Simple associations of proprietors, not necessarily formed into a community under the law, may, on the presentation of a proper mortgage bond, also claim the benefits above accorded to regular communities. But no such community or association can claim the premium on irrigation effected, which is offered to canal or reservoir companies as heretofore explained.

Examinations—Applications—Auctions.[1]

Under the general water law, when provincial *diputacions*, syndicates of land owners, or communities, municipalities, national or foreign companies, or private persons apply to the minister of public works for the examination of a project for a canal or reservoir of irrigation, he will order the necessary surveys, examinations, estimates, and plans to be made by the governmental civil engineers, when the public service will admit of a detail for the purpose, provided the petitioners agree to pay the expense of such work upon terms prescribed by him.—[Art. 201—appendix III.

The forms of and data to be furnished with all applications for concessions, are specified in the general water law [article 189], and certain conditions are stipulated with respect to available water supply, etc. [articles 190–191]. The law of 1883 treats of this subject more particularly. It says: "Each concession that is to be subsidized under this law shall be solicited, formulated, and determined upon conformably to the following prescriptions:

"There will be presented with the application a complete study of the project, showing the whole irrigable district, the gaugings of the volume of water available, the estimates of cost and specifications, the maximum rates to be charged annually for irrigation, per *litre* per second of flow, with tables of equivalents per *hectare* in different classes of cultivation, and an exhibit of the probable utility of the enterprise. And these shall be accompanied by the written agreement of the proprietors of more than half the lands in the district, under which they are obliged to take water at prices that do not exceed those expressed in the application."

[1] Same reference as for preceding subdivision.

The administration then orders its inquiry or investigation, which is extended and formal, calling in the services of an examining and a consulting engineer, the provincial authorities, the consulting board of roads, canals, and ports, and the council of ministers, to advise the minister of public works, under whose immediate charge the proceeding is had.

If it is determined to grant the concession and subsidize the enterprise, the plans and estimates are definitely fixed upon, the proportion of the cost to be borne by the state and rate of its payment are stipulated, and a provisional agreement is drawn up. The concession is then offered at public auction. Each bidder is required first to deposit, as a guaranty of good faith, in the government treasury, an amount of money equivalent to five per cent of the gross estimated cost of the works; and each of those who has not been the author of the scheme and paid for its examination, is required to deposit an additional amount sufficient to cover the cost of the same and to reimburse the author for his labors, as shall have been previously determined upon. The auction then goes on, and the concession is awarded to the bidder who agrees to carry out the enterprise with the least amount of money subsidy. If the offers should be equal on this point, the award is made to the bidder who agrees to reduce the premium the most. And if equal in this, also, to him who places the tariff for irrigation at the lowest rates. Finally, the successful bidder is required to furnish within fifteen days from the award, a bond for ten per cent of the gross estimate, which is to be held until the work is completed, while his cash deposit is returned to him in installments as the work progresses.

Terms of Concessions.[1]

Such concessions are made for terms of ninety-nine years. The time is specified within which each section of the work is to be completed. Forfeits are predetermined and agreed to for partial failures. Extensions of time are granted only when unforeseen natural circumstances are the cause of delay. Concessions are forfeited upon non-compliance with conditions. Such forfeiture is declared by the minister, and the enterprise and works are sold at auction for the benefit of creditors, and the grantee.

[1] Same reference as for preceding subdivision.

Companies or individuals, etc., having concessions of this character are required to pay taxes on the lands owned by them, but under the general law of waters their capital and works are exempt from taxation.

The law of 1883 closes with a number of provisions relative to the adjusting of benefits under it, to concessions obtained under former laws, and also recognizes the existence of subsidies under the law of 1870. So that as a matter of fact there may be enterprises subsidized under both laws, though not to the full extent allowed by either.

The duties and privileges of grantees and obligations of irrigators are set forth in articles 196 and 197 of the general law of waters, to which attention is here asked.—[See appendix III.

SECTION III.

Notable Irrigation Enterprises.[1]

In closing this account of the policy of Spain towards the irrigation interest, I present, as an exhibit of the extent to which the subsidy system has been applied, a tabulated statement of all the principal concessions which have been granted, with direct subsidies from the general government, under the laws of 1849, 1865, 1866, and 1870, up to the passage of the present general water law in 1879, and which were at that time in good standing. In addition to these, about half as many more important concessions had been made but were forfeited; a larger number of small concessions were registered and in good standing; and a very large number of small, individual, or association works had been carried out under the provisions of law which exempted the dependent lands from increased tax rating for ten years after irrigation.

Some of the following named projects were old or partly built works, for the enlargement, extension, or completion of which these concessions were made. But most of them were entirely new enterprises which the subsidy system brought into being. There are no statistics at hand of the application of the subsidy features of the laws of 1879 and 1883.

[1] See, Bentaból, and Ureta.

Notable Irrigation Concessions—Canals.

NAME OF THE CANAL.	Names of the Supplying Rivers.	Provinces Where Situated.	Length—Miles.	Allotment of Waters—Cubic Feet per Second.	Extent of Irrigable Land—Acres.	Estimated Cost.
Aragón and Cataluña Canals of the Ebro	Essara and Cinca	Huesca and Lérido	104.8	1,250	257,000	$6,000,000
Urgel	Ebro	Farragona	41.5		32,180	3,723,000
Esla	Legre	Lérido	45.9	1,180	242,140	3,882,000
Henares	Esla	León and Zamora	24.8	232	22,770	630,000
Jaca	Henares	Guadalahara	28.5	180	28,400	946,400
Guadalquivir	Aragón	Huesca	10.5	45	2,050	49,100
Guadiaro	Guadalquivir	Sevilla	46.5	534	53,080	1,939,000
Genal and Guadiaro	Guadiaro	Cádiz and Málaga	42.8	64	4,450	133,600
De la Oliva	Genal and Guadiaro	Málaga	14.3	22	1,480	32,400
Mediodia	Bullent	Valencia	3.1	36	2,260	18,300
De la Obra	Adra	Almeria	23.4	18	8,180	373,000
Guadiaro	Barranco de la Obra	Castillón	6.2	4	610	5,400
Gévora	Guadiaro	Cádiz and Málaga	7.5	7	817	24,600
Guadalentin	Gévora and Zapatón	Badajos	11.2	45	4,110	73,400
Guadalete	Guadalentin	Jaén and Granada	24.8	107	21,740	302,800
Duero	Guadalete	Cádiz	13.0	53	4,010	107,000
Derecha del Genil	Duero	Valadolid	31.6	150	19,760	866,400
Guadiana	Genil and Cubillas	Granada	37.8	107	9,600	133,400
Escatron	Guadiana	Ciudad-Real	39.0	200	16,060	489,800
	Ebro	Zaragosa	10.5	11	750	43,800

Notable Irrigation Concessions—Reservoirs.

NAME OF THE CANAL.	Names of the Supplying Rivers.	Provinces Where Situated.	Capacity—Cubic Feet.	Extent of Irrigable Land—Acres.	Estimated Cost.
Torralba de Ribota	Barranco de la Hoz	Zaragoza	1,505,000	558	$5,300
Isbert	Barranco de Infern	Alicante			420,000
Arba de Luesia	Arba de Luesia.	Zaragoza	79,835,000	4,940	39,700
Monteagudo	Regajo	Soria	227,500,000	1,531	50,000
Híjar	Arroyo Escurisa	Teruel	420,000,000	7,460	245,500
Elda	Vinalopó	Alicante	2,135,000	494	5,000
Puentes	Guadalantín	Murcia			1,562,400
Mezalocha	Huerva	Zaragosa	280,000,000	3,400	65,200

AUTHORITIES FOR CHAPTER XXII.

Bentaból y Ureta.—[Work cited as an authority for chapter XIX.]
Pardo.—[Work cited as an authority for chapter XIX.]
Memoria, etc.—[Work cited as an authority for chapter XIX.]
Wallis.—[Work cited as an authority for chapter XIX.]
Aymard.—[Work cited as an authority for chapter XVII.]
Llaurado.—[Work cited as an authority for chapter XVII.]
Llaurado.—"State Aid to Irrigation Enterprises." By D. Andrés Llaurado, Chief Engineer, etc.; Pamphlet, Madrid, 1882.

NOTE TO "SPANISH IRRIGATION LEGISLATION."

The subject of the old water and irrigation laws of Spain will be taken up in a chapter on their introduction into Mexico, in part III of this report, when some omissions that may appear to have been made in Chapter XVI of this volume, will be supplied.

CONCLUSION TO PART I.

Comparisons of practices and circumstances, results of policies, and applications of the lessons of European experience to any of our Californian questions, have been generally omitted from the foregoing chapters: the object being simply to narrate the facts and illustrate their immediate bearing in the several fields of inquiry, thus making this book a preliminary study of the subject, to be referred to from those which follow and wherein it will be sought to apply its lessons.

IRRIGATION LEGISLATION AND ADMINISTRATION.

APPENDICES.

APPENDICES TO PART I.

CONTENTS.

Appendix I.—France—Articles of the Civil Code, which specially relate to or affect Water-right and Irrigation matters.

Appendix II.—Italy—Articles of the Civil Code, which specially relate to or affect Water-right and Irrigation matters.

Appendix III.—Spain—New Law of Waters.
Ordinance for an Irrigation Community.
Regulation concerning Water-rights.

APPENDIX I.

ARTICLES OF THE CIVIL CODE OF FRANCE

Specially Relating to or Affecting

THE SUBJECTS OF

WATER-COURSES, WATERS, AND IRRIGATION.

CODE NAPOLEON—BOOK II.

Of Property, and the Different Modifications of Property.

TITLE I.

Of the Classification of Property.

Article 516. All property is movable or immovable.

Chapter I.—*Of Immovable Property.*

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Art. 526. Immovable in respect of the object to which they are applied are, (1) The usufruct of immovable things; (2) Servitudes or agricultural services; etc.

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Chapter III—*Of Property, with Reference to those who are in the Possession of it.*

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Art. 538. Highways, roads, and streets at the national charge; rivers and streams which will carry floats; shores, lands covered and uncovered by the sea; ports, harbors, anchorages for ships, and generally all portions of the national territory which are not susceptible of private proprietorship, are considered as dependencies on the public domain.

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[1] Decreed January 25th, promulgated February 4th, 1804.

ART. 542. Common property is that to the ownership or produce of which the inhabitants of one or more communes have an acquired right.

ART. 543. One may have over property either a right of ownership or a simple right of enjoyment, or only claims for ground services.

TITLE II.

OF PROPERTY.[1]

ART. 544. Property is the right of enjoying and disposing of things in the most absolute manner, provided they are not used in a way prohibited by the laws or statutes.

ART. 545. No one can be compelled to give up his property, except for the public good, and for a just and previous indemnity.

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CHAPTER II—*Of the Right of Accession over what is Connected and Incorporated with Anything.*

ART. 551. Everything which is connected and incorporated with anything belongs to the proprietor, according to rules which shall be hereafter established.

Section First—Of the Right of Accession Relating to Things Immovable.

ART. 552. Property in the soil imports property above and beneath. The proprietor may make above (the surface) all kinds of plantations and buildings which he shall judge convenient, saving the exceptions established under the title "*Of Servitudes and Services Relating to Land.*" He may make beneath (the surface) all buildings and excavations which he shall judge convenient, and draw from such excavations all the products which they are capable of furnishing, saving the restrictions resulting from the laws and statutes relating to mines, and from the laws and regulations of police.

ART. 553. All buildings, plantations, and works upon the soil or beneath the surface, are presumed to have been made by the proprietor at his own expense, and to belong to him until the contrary be shown, without prejudice to the property which a third person may have acquired or may acquire by prescription, whether it be a vault beneath the building of another, or any other part of the building.

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[1] Decreed the 27th of January; promulgated the 6th of February, 1804.

ART. 556. The accumulations and increase of mud formed successively and imperceptibly on the soil bordering on a river or other stream is denominated "alluvion."

Alluvion is for the benefit of the proprietor of the shore, whether in respect of a river, a navigable stream, or one admitting floats, or not, on condition, in the first case, of leaving a landing place or towing path conformably to regulations.

ART. 557. It is the same with regard to changes occasioned by a running stream retiring insensibly from one of its banks, and encroaching on the other; the proprietor of the bank added to profits by the alluvion, without giving the proprietor on the opposite side a right to reclaim the land which he has lost. This right does not apply to encroachments or alluvions of the sea.

ART. 558. Alluvion does not apply to lakes and ponds, the proprietor of which preserves always the land which the water covers when it is at the pond's full height, even though the volume of water should be diminished. In like manner the proprietor of a pond acquires no right over land bordering on his pond which may happen to be covered by an extraordinary flood.

ART. 559. If a river or a stream, navigable or not, carries away by a sudden violence a considerable and distinguishable part of a field on its banks, and bears it to a field lower or on its opposite bank, the owner of the part carried away may reclaim his property; but he is required to make his demand within a year: after this interval it is inadmissible, unless the proprietor of the field to which the part carried away has been united, has not taken possession thereof.

ART. 560. Islands, islets, and accumulations of mud formed in the bed of rivers or streams navigable, or floatable, belong to the nation, if there be no title or prescription to the contrary.

ART. 561. Islands and accumulations of mud formed in rivers and streams not navigable, and not floatable, belong to the proprietors of the nearest shore, where the island is formed near one side only; when formed in midstream, it belongs to the proprietors of the shores on the two sides, divided by an imaginary line drawn through the middle of the river.

ART. 562. If a river or other stream in forming itself a new arm, divide and surround a field belonging to the proprietor of the shore, and thereby form an island, such proprietor shall retain the ownership of his land, although the island be formed in a river, or in a navigable stream or one floatable.

ART. 563. If a river or a navigable stream, capable of admitting floats or not, form a new course, abandoning its ancient bed, the proprietors of the land newly occupied, take, by title of indemnity, the ancient bed abandoned, each in proportion to the land of which he has been deprived.

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TITLE IV.

Of Servitudes, or Manorial Services.[1]

Art. 637. A servitude is a charge imposed upon an estate for the use and benefit of an estate belonging to another proprietor.

Art. 638. Servitude does not establish any preëminence of one estate over another.

Art. 639. It is derived either from the natural situation of places, or from obligations imposed by law, or from agreements between proprietors.

Chapter I—*Of Servitudes Derived from the Situation of Places.*

Art. 640. Lower lands are subjected, as regards those which lie higher, to receive the waters which flow naturally therefrom to which the hand of man has not contributed. The proprietor of the lower ground cannot raise a bank which shall prevent such flowing. The superior proprietor of the higher lands cannot do anything to increase the servitude of the lower.

Art. 641. He who possesses a spring within his field may make use of it at his pleasure, saving the right which the proprietor of a lower field may have acquired by title or by prescription.

Art. 642. Prescription in such case can only be acquired by an uninterrupted enjoyment during the space of thirty years, to be computed from the moment at which the proprietor of the lower field has made and completed the works apparently designed to facilitate the fall and course of the water within his property.

Art. 643. The proprietor of a spring cannot change the course thereof when it supplies the inhabitants of a commune, village, or hamlet, with water for their necessary use; but if the inhabitants have not acquired the use of it, by prescription or otherwise, the proprietor may claim an indemnity, to be settled by competent persons.

Art. 644. He whose property borders on a running water, other than that which is declared a dependency on the public domain by article 538, under the title, "*Of the Distinction of Property,*" may employ it in its passage for the watering of his property. He whose estate is intersected by such water, is at liberty to make use of it within the space through which it runs, but on condition of restoring it, at the boundaries of his field, to its ordinary course.

Art. 645. If a dispute arise between proprietors to whom such waters may be useful, the courts, in pronouncing their judgment, must reconcile the interest of agriculture with the respect due to

[1] Decreed the 31st of January, promulgated the 10th of February, 1804.

property; and in all cases particular and local regulations on the course and use of waters must be observed.

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CHAPTER II—*Of Servitudes Established by Law.*

ART. 649. Servitudes established by law have for their object the public benefit, or that of the commune, or of private persons.

ART. 650. Those established for the public benefit, or that of the commune, have for their object footways by the side of navigable rivers or floatable streams, the construction or reparation of roads and other public works, or those relating to the commune. Everything relating to this species of servitude is determined by the laws or by particular regulations.

ART. 651. The law subjects proprietors to different obligations as respects each other, independently of all agreements.

ART. 652. Part of these obligations is regulated by the laws touching rural police. Others relate to party-walls and ditches, and the cases in which supporting walls are necessary, to views over the property of a neighbor, to the dropping of water from house eaves, to rights of way.

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CHAPTER III—*Of Servitudes Established by the Act of Man.*

Section First—Of the different species of Servitudes which may be Established over Property.

ART. 686. It is allowed to proprietors to establish over their property, or in favor of their property, such servitudes as seem good to them, provided, nevertheless, that the services established be not imposed either on a person, or in favor of a person, but only on an estate and for the benefit of an estate, and, provided, moreover, such services contain nothing contrary to public order.

The mode of using and extent of servitudes thus established, are governed by the document which constitutes them; in default of such document, by the rules hereafter given.

ART. 687. Servitudes are established either for the use of buildings, or for that of landed estates. Those of the first species are called *urban*, whether the buildings to which they are due are situated in a town or in a field. Those of the second species are called *rural*.

ART. 688. Servitudes are either continual or interrupted. Continual servitudes are those whose use is or may be continual without having a necessity for the positive act of man. Such are water pipes, house eaves, windows, and other things of that description. Interrupted servitudes are those which require the pos-

itive act of man for their exercise. Such are rights of way, of drawing water, of pasture, and other similar ones.

ART. 689. Servitudes are apparent or non-apparent. Apparent servitudes are those which are manifested by external works, such as a gate, a window, or aqueduct. Non-apparent servitudes are those which have no external sign of their existence, as, for example, a prohibition to build upon a field, or against building beyond a determinate height.

Section Second—Of the Mode of Establishing Servitudes.

ART. 690. Continual and apparent servitudes are acquired by deed, or by possession for thirty years.

ART. 691. Continual non-apparent servitudes, and interrupted servitudes whether apparent or not, can only be established by deeds. Even immemorial possession does not suffice to establish them; without power, nevertheless, to impeach at the present time servitudes of this nature already acquired by possession in districts where they may have been acquirable in this manner.

ART. 692. The appointment of a father of a family is equivalent to a deed as regards continual and apparent servitudes.

ART. 693. There is no appointment by the father of a family but when it is proved that the two farms actually divided have belonged to the same proprietor, and that it is by him that things have been put into the state whence results the servitude.

ART. 694. If the proprietor of two estates between which there exists an apparent sign of servitude, disposes of one of these estates without inserting in the contract any stipulation relative to the servitude, it continues to exist actively or passively in favor of the land alienated, or over the land alienated.

ART. 695. The deed constituting servitude, as far as respects those which cannot be acquired by prescription, can only be supplied by a document acknowledging the servitude, and emanating from the proprietor of the estate subject to servitude.

ART. 696. When a servitude is established, it is considered that everything is granted which is necessary in order to make use of it. Thus the servitude of drawing water at another's fountain necessarily imports a right of way.

Section Third—Of the Rights of the Proprietor of the Estate to which the Servitude is Due.

ART. 697. He to whom a servitude is due, has a right to form all the works necessary to make use of and preserve it.

ART. 698. These works are at his own expense, and not at that of the proprietor of the estate subjected to servitude, unless the deed establishing the servitude declare the contrary.

ART. 699. In the case even where the proprietor of an estate subjected to servitude is charged by the deed with the construction, at his own expense, of works necessary for the usage or preservation of the servitude, he may always get rid of such charge by abandoning the estate subjected to servitude to the proprietor of that estate to which the servitude is due.

ART. 700. If the estate for the benefit of which the servitude has been established happens to be divided, the servitude remains due for each portion, provided always, nevertheless, that the burden of the estate subjected to servitude shall not be aggravated. Thus, for example, if the case be respecting a right of way, all the joint proprietors shall be obliged to exercise it by the same path.

ART. 701. The proprietor of an estate from which a servitude is due can do nothing which tends to diminish the usage thereof, or to render it less satisfying. Thus he cannot change the condition of places nor transport the exercise of the servitude into a place different from that in which it has been originally assigned. Nevertheless, if this original assignment has become more burdensome to the proprietor of the estate subjected to the servitude, or if he is prevented from making there advantageous repairs, he may offer to the proprietor of the other estate a place equally commodious for the exercise of his rights, and the latter shall not be at liberty to refuse.

ART. 702. On the other hand, he who claims the servitude, can only use it according to his title, without power to effect either in the estate which owes the servitude, or in the estate to which it is due, any change which aggravates the condition of the former.

Section Fourth—Of the Manner in which Servitudes are Extinguished.

ART. 703. Servitudes cease when things are in such a state that it is impossible any longer to make use of them.

ART. 704. They revive if things are reëstablished in such a manner that they can be made use of; unless a sufficient space of time have already elapsed to raise a presumption that the servitudes have been extinguished, as is described in article 707.

ART. 705. Every servitude is extinguished when the estate to which it is due, and that which owes it, are united in the same hands.

ART. 706. A servitude is extinguished by non-usage during thirty years.

ART. 707. The thirty years begin to run according to the different species of servitudes, either from the day on which they have ceased to be enjoyed, when the case regards interrupted servitudes, or from the day on which an act has been made contrary to the servitude, in the case of continual servitudes.

ART. 708. The mode of servitude is subject to prescription like the servitude itself and in the same manner.

ART. 709. If the estate in favor of which the servitude is established belong to several coparceners, the enjoyment by one precludes prescription with regard to all.

ART. 710. If among the joint proprietors there be one against whom the prescription has not been able to run, as a minor, he shall have preserved the right for all the others.

BOOK III.

OF THE DIFFERENT MODES OF ACQUIRING PROPERTY.[1]

General Dispositions.

ART. 711. Ownership in goods is acquired and transmitted by succession, by donation between living parties, or by will and by the effect of obligations.

ART. 712. Ownership is acquired also by accession, by incorporation, and by prescription.

ART. 713. Property which has no owner belongs to the nation.

ART. 714. There are things which belong to no one, and the use whereof is common to all. The laws of police regulate the manner of enjoying such.

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AUTHORITY FOR APPENDIX I.

The foregoing translation of articles from the code Napoleon, is that of Richards, with a very few corrections of wording where relating to physical subjects, made after examination in the French edition of the code, by Pigoreau. See authorities for chapter II, p. 73, *ante*.

[1] Decreed the 19th of April, 1803. Promulgated the 29th of the same month.

APPENDIX II.

ARTICLES OF THE CIVIL CODE OF ITALY

Specially Relative to or Affecting

THE SUBJECTS OF

WATER-COURSES, WATERS, AND IRRIGATION.

ITALIAN CODE—BOOK II.

Of Property, and of the Modification of Property.

TITLE I.

Of the Classification of Property.

Article 406. All things which can be the subject of public or private ownership are ranked as immovable or as movable property.

Chapter I—*Of Immovable Property.*

Art. 407. Properties are immovable by nature, by their destination, or with reference to the object to which they relate.

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Art. 412. Springs, reservoirs, and water-courses are immovable in their nature. Canals which take water to a building or estate are also immovable and form part of the building or estate to whose service the water is devoted.

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Art. 415. The law considers immovable with respect to the object to which they relate: * * * Pradial servitudes; * * *.

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CHAPTER III—*Of Property Relatively to the Person to Whom it Belongs.*

ART. 425. Properties belong to the state, to a province, to communes, to public institutions, or other moral bodies, or to private individuals.

ART. 426. Properties of the state are classed in the public domain and in patrimonial properties.

ART. 427. The national roads, the shore of the sea, the harbors, bays, coasts, rivers, and torrents, the gates, walls, ditches, and bastions of forts and fortifications, form part of the public domain.

ART. 428. Whatever other species of property appertains to the state forms part of its patrimony.

ART. 429. Lands of fortifications and bastions of forts which cannot be applied to their intended use, and all the other properties which cease to be applied to public use or to the national defense, pass from the public domain to the patrimony of the state.

ART. 430. The properties of the public domain are by their nature inalienable; while those of the patrimony of the state cannot be alienated except in conformity with special laws which govern it.

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ART. 432. Properties of the provinces and of the communes are classified into properties of public use and patrimonial properties. The purpose, the mode, and the conditions of the public use, and the mode of administration and of alienation of patrimonial properties, are determined by special laws.

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TITLE II.

OF PROPERTY.

CHAPTER I—*General Provisions.*

ART. 436. Property is the right of enjoying and disposing of things in the most absolute manner, provided they are not applied to a use prohibited by the laws or ordinances.

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ART. 438. No one can be compelled to cede his property, or to permit that others make use of it, if not for a cause of public utility legally recognized and declared, and following the pay-

ment of a just indemnity. The forms relative to expropriation for purposes of public utility are determined by special laws.

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ART. 440. He who has the property of the soil has for his the space over it and all that is found upon or beneath the surface.

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ART. 443. Property in a thing, whether movable or immovable, includes the right to all which it produces, whether this is accomplished naturally or by artificial means; this right is called the *right of accession.*

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CHAPTER III—*Of the Right of Accession to that which is Incorporated with or United to a Thing.*

ART. 446. All that which is incorporated with or is united to a thing, appertains to the proprietor of it, under the rules established in the following.

Section First—Of the Right of Accession Relatively to Immovable Things.

ART. 447. A proprietor may make upon his own soil any construction or plantation whatever, saving the restrictions established under the head "Of Pradial Servitudes." Similarly, he may make beneath the soil any construction or excavation whatever, and take all the possible products, saving the restrictions of the law and regulations concerning mines and police.

ART. 448. Every construction, plantation, or work upon or under the soil is presumed made by the proprietor at his own expense, and belongs to him, while not proven to the contrary, and without prejudice, however, to the rights of third parties, legitimately acquired.

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ART. 453. The uniting of lands and their increments, which are formed gradually and imperceptibly in estates bordering on the banks of rivers and torrents, are called alluvions. Alluvions form to the benefit of the owner along the bank of the river or torrent, whether navigable and floatable or not, with the obligation in the first case of permitting a tow-path, according to regulations.

ART. 454. Land abandoned by running water which insensibly is retired from one of the banks to another, belongs to the proprietor of the bank uncovered, without power on the part of the losing proprietor to reclaim the land lost. This right does not apply to lands abandoned by the sea.

ART. 455. The right of alluvion as relating to lakes and standing waters does not exist. The owners of these hold always that

which the water covers when it is at the greatest height of flood in the lake or pond, when it comes to be reduced. Likewise the proprietor of a lake or pond does not acquire any right over the land along the shore which the water covers in case of extraordinary overflowing.

ART. 456. If a river or torrent by sudden force takes a considerable and recognizable part of a property contiguous to its course, and transports it against a lower property, or against the opposite bank, the proprietor of the part taken may reclaim his propertyship within a year. After the passing of this term, the demand shall not be admitted, unless that the proprietor of the land to which the part moved has been added has not yet taken possession of it.

ART. 457. The islands, islets, and unitings of land which are formed in the beds of navigable or floatable rivers or torrents, belong to the State, if there exists no title by prescription to the contrary.

ART. 458. The islands and unions of land which are formed in rivers and torrents not navigable nor floatable, belong to the fronting proprietors to the extent of the middle line of the river or torrent. If the island or union of land is situated nearer to one bank than the medium line, then it belongs to the proprietor of the nearest bank. The portions of the island or union of earth due to proprietors of opposite banks, is determined by measurements perpendicular to the middle line of the stream, made at the extreme point of frontage of each property.

ART. 459. The dispositions of the two preceding articles are not applicable to the case where an island is formed with land taken by sudden force from a bank and transported into the river or torrent. The proprietor of the property from which the land is taken preserves his ownership; but in the case of navigable and floatable rivers, the State has the right to make purchase from the proprietor, making payment of a proper indemnity.

ART. 460. If a river or torrent forming a new course, surrounds and encircles property of a bordering proprietor, forming an island, he shall preserve the ownership of the property, saving the prescription established in the preceding article.

ART. 461. If a river or torrent forms a new bed, abandoning its ancient one, this belongs to the proprietors bordering on the two banks. This is to be divided to the middle of the channel, in proportion to the frontage of each one.

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TITLE III.

Of the Modifications of Property.

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Chapter II—*Of Pradial Servitudes.*

Art. 531. A pradial servitude consists in a burden imposed upon one estate for the use and utility of an estate belonging to another proprietor.

Art. 532. Pradial servitudes are established by law and by the acts of man.

Section 1—Of Servitudes Established by Law.

Art. 533. Servitudes established by law have for their object either public or private utility.

Art. 534. Servitudes established for public utility relate to a water-course, to foot-paths along rivers and navigable canals, or acts of passage, to the construction and repairing of roads and other public works. All things which concern this species of servitude will be determined by laws and special regulations.

Art. 535. Servitudes which the law imposes for private use, are determined by the law and regulations of rural police, and by the dispositions of the present section.

Section First—Of Servitudes Resulting from the Situation of Places.

Art. 536. Lower estates are obliged to receive the water which flows naturally off those higher up, so long as such flow is not occasioned by the act of man. The owner of the lower estate must not in any way interfere with this flow. The owner of the upper estate must not do anything to increase the servitude of the lower estate.

Art. 537. If the banks and barriers existing on an estate, and serving to retain water, should have been destroyed or carried away, or repairs should be proposed, which changes in the course of the waters render necessary, and should the owner of the estate not wish himself to repair, rebuild, or construct them, the owners injured or whose property may be in peril, may execute at their own expense the necessary repairs or constructions. The work, however, must be executed so that the owner of the estate shall not suffer injury, and after procuring judicial sanction, those interested having been heard and the special rules about water having been complied with.

Art. 538. The same holds good when it is proposed to remove

an obstruction formed on an estate, or in a ditch, brook, drain, or other channel, by substances stopped in it so that the water injures or may injure the neighboring estates.

ART. 539. All the proprietors to whom the preservation of the banks and barriers, or the removal of the obstructions mentioned in the two preceding articles are beneficial, may be summoned and obliged to contribute to the expense in proportion to the advantages which each receives therefrom, always provided that the injuries or expenses which may have been occasioned by the destruction of the barriers, or by the formation of the aforesaid obstructions, shall be made good.

ART. 540. He who has a spring on his estate, may use it at his pleasure, saving the right which the proprietor of a lower estate may have acquired by force of title or prescription.

ART. 541. The prescription in this case does not hold good except after a possession of thirty years, computed from the day on which the owner of the lower estate has made and finished on the upper estate visible and permanent works destined to facilitate the fall and course of the water to his own estate, and which works have served for that purpose.

ART. 542. The owner of a spring may not divert its course when the same supplies the inhabitants of a community, or a portion of one, with water which is necessary for them; but if the inhabitants have not acquired the use of it, or have not got it by right of prescription, the owner has a right to compensation.

ART. 543. Whoever has an estate bordering on a stream which flows naturally and without artificial works, excepting such as are declared public domain by article 427, or over which others have a right, may, whilst it runs along, make use of it for the irrigation of his lands, or for the prosecution of his industries, on condition, however, of restoring the drainage and residue of it to the ordinary channel. Whoever has an estate crossed by such water may also use it in the interval in which it is running through, but with the obligation of restoring it to its natural course when it leaves his lands.

ART. 544. Should a dispute arise between owners to whom the waters may be of use, the judicial authority must reconcile the interests of agriculture and industry, with the consideration due to property, and in all cases the special and local rules of the water-course and use of waters must be observed.

ART. 545. Any owner or possessor of water may make use of it at his pleasure, or even dispose of it in favor of others, where no title or prescription prevents; but after having used it he may not divert it so that it may be consumed to the injury of other estates, where it could be used without damming it up, or otherwise prejudicing those using it above, and which, by means of an equivalent compensation, give payment for that by which they profit,

where a spring or other water belonging to the owner of the upper estate is treated for.

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Section Third—Of Intermediate Distances and Works.

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ART. 575. No one may dig ditches or canals without keeping a distance from the boundary of the estate of another person at least equal to their depth, except when a greater distance may have been established by local regulations.

ART. 576. The distance shall be measured from the edge of the bank of the ditch or canal nearest to the said boundary. This bank must, moreover, be inclined at a slope; and, if without a slope, be provided with works of support. When the boundary of an estate of another is found in a common ditch, or else in a private road but common to both estates, or subject to a right of passage, the distance shall be measured from the aforesaid edge to the edge of the bank of the common ditch, or else to the margin or exterior border of the road nearest to the new ditch or canal, subject to the dispositions in relation to the slope.

ART. 577. If the ditch or canal be dug in the neighborhood of a party wall, the aforesaid distance is not required, but all the works must be executed so as to prevent any damages.

ART. 578. Whoever wishes to open springs, to establish heads or branches of fountains, canals, or water-courses, or to dig, deepen, or enlarge their bed, to increase or diminish their fall, or alter their form, must, besides the distance above decreed, observe whatever greater distance and execute whatever works may be necessary so as not to injure estates, springs, heads or branches of fountains, canals, or aqueducts belonging to others, existing already and destined for the irrigation of lands or the supply of buildings.

Where a dispute arises between two proprietors, the judicial authority must conciliate them in the fairest manner and with respect to the consideration due to the rights of property and to the greater advantages which may be obtained to agriculture or to industry, from the use to which the water is put, or intended to be put, awarding, where it may be necessary, to one or the other of the proprietors that compensation which they ought to have.

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Section Sixth—Of the Right of Passage and of Aqueduct.

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ART. 598. Every proprietor has to give passage through his estates for waters of any kind which have to be conducted by any one who has permanently, or even only temporarily, the right

to make use of them for the necessities of life, or for agricultural or industrial purposes. There are excepted from this servitude houses, and the courts, gardens, and yards belonging to them.

ART. 599. Whoever demands a passage must open the necessary canal, without causing its waters to flow in the canals already existing and intended as the course of other waters. But the proprietor of the estate, who is also proprietor of a canal existing thereon and of the waters flowing therein, can prevent a new canal being opened on his land, offering to give passage for the waters in the same canal, when it can be done without notable damage to him who demands the passage. In such case there will be due to the proprietor of the canal an indemnity to be determined, having regard to the water introduced, the value of the canal, the work that will be rendered necessary for the new passage, and the increased expense of maintenance.

ART. 600. Passage for water across canals or aqueducts must also be allowed, in the manner known to be most convenient and adapted to the locality and to their state, provided that the course or the volume of the waters flowing in them may not be impeded, retarded, or accelerated, nor in any way altered.

ART. 601. Having to conduct waters across public highways, rivers, or torrents, the special rules and regulations concerning highways and waters must be observed.

ART. 602. Whoever desires to make water pass through the estate of another, must show that he can dispose of the water during the time for which he demands the right of passage; that the same will be sufficient for the use to which it is desired; that the passage demanded will be the most convenient and the least prejudicial to the serving property, having regard to the circumstances of the neighboring estate, to the slope, and to the other conditions for the conducting, the course, and the discharge of the waters.

ART. 603. Before undertaking the construction of the aqueduct, whoever may wish to conduct water through the property of another, must pay the estimated value of the ground occupied, without subtraction of the taxes or the other imposts inherent to the property, and with the addition of one fifth over and above the reimbursement, for immediate damages, including those arising from the division of the land into two or more parts, or from other deterioration of the ground by cutting up.

The ground which would be occupied solely for the deposit of the material excavated, or for the throwing out of silt, will only be paid for at the rate of half the value of the land with the addition of one fifth, and always without subtraction of the taxes or other inherent imposts; but in the same ground the proprietor of the serving property may plant and raise trees or other vegetation, and remove and transport the accumulated material, provided it is done without damage to the canal, its cleansing, or maintenance.

ART. 604. When a demand for the passage of waters is for a time not greater than nine years, the payment of the value and the indemnity to which reference is made in the preceding article, will be restricted to only one half, but with the obligation at the end of the term to replace things in their original state. Whoever has obtained this temporary passage can, before the completion of the term, render it perpetual by paying the other half, with legal interest thereon, from the day on which the passage was first effected. The term once concluded no account will be taken of that which has been paid for the temporary concession.

ART. 605. Whoever possesses a canal on the estate of another cannot introduce in it a greater quantity of water than that which the canal is known to be capable of carrying, and must not cause any damage to the serving property.

If the introduction of a greater quantity of water necessitates new works, these cannot be undertaken until their nature and kind are first determined and the sum due for the ground to be occupied and the damage established in the manner laid down in article 603, are paid. The same holds good when for the passage across an aqueduct there has to be substituted a canal bridge, a pipe, or *vice versa*.

ART. 606. The dispositions contained in the preceding articles with regard to the passage of the waters are extended to the case in which passage is demanded for the purpose of wasting superfluous waters that the neighboring owner would not consent to receive on his property.

ART. 607. It will always be in the power of the proprietor of the serving ground to cause the bottom of the canal to be fixed in a stable manner by the laying of pavement or sills to be placed at fixed points. But where he did not make use of said power in the first concession of the aqueduct, he will have to support half the necessary expense.

ART. 608. Where a water-course prevents the owner of contiguous lands from gaining access to the same, or prevents the continuation of the irrigation and drainage of waters, those who are served by that water-course are obliged, in proportion to the benefits which they receive, to construct and maintain the bridges and their approaches in a way sufficient for commodious and secure transit, as well as the syphons, the canal bridges or other similar works for the continuation of the irrigation or the drainage, saving rights arising from agreement or prescription.

ART. 609. The proprietor who intends to dry out his land or render it salubrious by subdrainage, by warping, or by any other means, has the right, by previous payment of indemnity and with the least damage possible, to conduct by drain or ditch the waters of drainage across the lands which separate his from a water-course or any other drain.

ART. 610. The owners of estates crossed by a drain or ditch of another, or who could otherwise profit by the work done in virtue of the preceding articles, have the power to make use of them for the improvement of their property, on the condition that this may not bring any damage on the property already improved, and that they bear:

First—The new expense needed to modify the work already done, in order that it can serve also for the property crossed.

Second—A proportional part of the expenses already incurred, and of those needed to maintain the work which has become common.

ART. 611. In the execution of the work indicated in the previous articles, the disposition of the first clause of article 598 and articles 600 and 601 are applicable.

ART. 612. If in the drainage of a marshy property any one having a right to the water which is drawn off should object, and if with proper works, bearing an expense proportional to their scope, the two interests cannot be conciliated, the drainage shall nevertheless be made, after payment of a sufficient indemnity to the opponent.

ART. 613. Whoever has a right to derive waters from rivers, torrents, streams, canals, lakes, or reservoirs, can, where it may be necessary, place or fix an inclosure on the banks, though with the obligation to pay the indemnity and to make and maintain the works which are suitable to guarantee the estates from any damage.

ART. 614. He having the right to the derivation and use of waters, as described in the preceding article, must avoid, between the users higher up and those lower down, every injury which may arise from the stopping up or excessive flow, or from the diversion of the said water. Those persons who may have caused such injury are held to compensation for damage, and are subject to the penalties established by the regulations of rural police.

ART. 615. Concessions by the state for the use of water are always understood to be made without injury to former rights to the use of said water, which might have been legitimately acquired.

CHAPTER III—*Of Servitudes Established by the Acts of Man.*

Section First—Of the Different Kinds of Servitudes which can be Laid upon Estates.

ART. 616. Proprietors can establish on their estates, or for their benefit, any servitude, provided that it may only be imposed on one property and for the advantage of another, and that it may not be in any way opposed to the public order.

The exercise and extension of servitudes are regulated by the title, and in default of this by the following dispositions.

ART. 617. Servitudes are continuous or discontinuous. They are continuous when their existence is or may be continuous without an actual act of man being necessary: such are those of aqueducts, dropping of water, views, and such like.

They are discontinuous when they require an actual act of man to be exercised: such are those of passage, of drawing water, of conducting cattle to pasture, and the like.

ART. 618. Servitudes are apparent or non-apparent. They are apparent when they are manifested by visible signs; as a gate, a window, a canal. They are non-apparent when they have no visible sign of their existence; as the prohibition to build on an estate, or to build except at a fixed height.

ART. 619. The servitude of taking water by means of canals or other visible and permanent works, for whatever purpose they may be intended, is included among the number of continuous and apparent servitudes, even should the taking of the water not be exercised except at intervals of time or by a routine of days or hours.

ART. 620. When for the derivation a constant and fixed quantity of running water, the form of the gate opening and of the structure has been agreed on, that form must be maintained, and parties are not permitted to interfere with it under the pretense of an excess or deficiency of water, unless that excess or deficiency arises from a subsequent variation in the supplying canal, or in the course of the water flowing in it.

If the form has not been determined on, but the opening and works of derivation have been constructed and possessed peaceably during five years, then it is not permitted, after such time, to make reclamation of a part under the pretense of excess or deficiency of water, except in the case of variation taken place in the canal or in the course of the water as above. In the absence of agreement or of the possession above mentioned, the form shall be determined by the judicial authorities.

ART. 621. In concessions of water made for a definite service, without the volume being expressed, it is understood that the amount necessary for the object is granted; and whoever is concerned in it may at any time cause the form of derivation to be established in a manner that at all times there shall be enough delivered for use, and an excess prevented.

But if the form of the intake and headworks has been agreed on, or if, in the absence of an agreement, it has been peaceably used for five years, no alteration of the parts is then permitted, except in the case mentioned in the preceding article.

ART. 622. In new concessions in which is laid down and expressed a constant volume of water, the volume conceded must always be expressed in terms of modules. The module is the

unit of measure of running water. It is a body of water which flows with the constant volume of 100 litres per second, and is divided into tenths, hundreds, and thousandths.

ART. 623. The right to the taking of a flow of water can be exercised at every instant.

ART. 624. Such a right is exercised for the summer waters from the spring to the autumn equinox; for the winter waters, from the autumn to the spring equinox; and for water distributed at intervals of hours, days, weeks, months, or otherwise, in the times laid down by the agreement or possession. The distribution of water by days or by nights refers to the natural day or night only. The use of water on feast days is regulated by the festivals ordained to be observed at the time when the use was agreed on or when the possession began.

ART. 625. In the distribution of water by turns, the time which the water takes to arrive at the opening of derivation of the user, is consumed at his charge, and the tail of the water supply belongs to him whose turn is ceasing.

ART. 626. In canals subject to distribution by turns, the waters rising or escaping, but contained within the channel of the canal, cannot be stopped or taken off by a user, except at the time of his own turn.

ART. 627. In the same canals the users may vary or exchange their turns among themselves, provided such changes cause no injury to the others.

ART. 628. Whoever has a right to make use of the water as a motive power cannot, without an express stipulation of the title, hinder or slacken its flow, causing it to overflow or be backed up.

Section Second—Of the Manner in which by the Act of Man Servitudes are Established.

ART. 629. Continuous and apparent servitudes are established by the effect of a title, or with the prescription of thirty years, or by the appointment of the father of a family.

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ART. 631. In affirmative servitudes the possession necessary for the prescription is computed from the day on which the proprietor of the dominant estate commenced to exercise it upon the servient estate. In negative servitudes the possession commences from the day of the prohibition made with formal act, by the proprietor of the dominant estate to him of the servient estate by contesting the free use of the same.

ART. 632. The appointment of the father of a family has place when it is evident, by any sort of proof, that two estates, actually divided, were once possessed by the same proprietor, and that the

thing or state from which resulted the servitude was his will or permission.

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ART. 637. Drainage waters derived from another estate may constitute an active servitude, claimable by the estate which receives it, to the extent of preventing its diversion. When such a servitude is claimable by prescription, it is only considered to commence from the day on which the owner of the dominant estate may have made on the servient estate visible and permanent works, with the view of collecting and conducting the said drainage waters for his own profit; or from the day on which the owner of the dominant estate may have commenced and continued to enjoy them, notwithstanding a formal act of opposition on the part of the owner of the servient estate.

ART. 638. The regular cleansing and the maintenance of the banks of an open channel upon the estate of another, destined and serving to collect and draw off the drainage, infers the presumption that it is the work of the owner of the dominant estate, when there may be no title, sign, or proof to the contrary. The existence on the channel, of structures built and maintained by the owner himself of the estate in which the channel is opened, is considered a contrary sign.

Section Third—In what Manner Servitudes are Exercised.

ART. 639. A right of servitude includes all that is necessary for its use. Thus the servitude of taking water from the fountain of another includes the right of passage through the estate to the fountain from which it is taken. Likewise, the right to lead water through the estate of another comprehends that of passage along the banks of the canal for guarding the conducted water, and to make the cleanings and repairings necessary.

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ART. 642. In the servitude of taking and of conducting water when the title does not otherwise express, the proprietor of the servient estate can always demand that the excavation be maintained conveniently clean, and that the banks be kept in a state of good repair, at the expense of the proprietor of the dominant estate.

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ART. 648. A right to the conducting of water does not confer on the conducter the ownership of the lands of the banks or bed of the spring or supplying channel. The property tax and other burdens belonging to estates are to be borne by its owners.

ART. 649. In the absence of special agreement, the owner or other granter of the water of a fountain or of a canal, is bound towards the users of it, to execute the ordinary and extraordinary works for the derivation and conducting of the water up to the

point at which it is delivered, to maintain the structures in good condition, to preserve the bed and banks of the source or of the canal, to perform the ordinary cleansings, and to use diligence, care, and watchfulness, to the end that the derivation and regular supply of the water may be effected in proper time.

ART. 650. The granter of the water, however, should there prove to be a deficiency of the same, naturally brought about, or even by the act of another, which in no way, directly or indirectly, can be imputed to him, is not bound to pay for damages, but only to allow a proportional diminution of the rent or price agreed on, as it falls due, or even after it has been paid, saving always the right of the granter or grantee to damages from the author of the deficiency. When users are agreed as to the author of the damage, they may oblige the granter to take legal action, and to assist by every means in his power to procure compensation for the damage caused by the deficiency.

ART. 651. The deficiency of water must be borne by whoever has a right to take and use it in the time during which such deficiency happens, saving always the right of compensation for injuries, and to a diminution of the rent or price as in the preceding article.

ART. 652. Among different users, the deficiency of the water should be borne first by those whose title or possession is the most recent; or, among users similarly situated, by the last user. The right to compensation for the injuries caused by the deficiency is always excepted.

ART. 653. When the water has been granted, reserved, or possessed for a determined use, with the obligation of restoring to the granter or to others whatever is over, such an arrangement must not be changed to the injury of the estate to which the restitution is due.

ART. 654. The owner of an estate bound to restore the drainage or the residue of the water, must not divert any portion of it under plea of having introduced a greater quantity of flowing water or a different body, but must permit it to flow off entirely in favor of the estate below.

ART. 655. The servitude to drainage does not deprive the owner of the servient property of the right of freely using the water to benefit his own estate, of changing the cultivation on it, or even of abandoning entirely or partly the irrigation of it.

ART. 656. The owner of an estate subjected to the servitude of drainage, or of supplying surplus water, can always free himself from such servitude by ceding and insuring to the dominant estate a volume of running water, the quantity of which shall be determined by the judicial authority, due account being taken of all the circumstances of the case.

ART. 657. Those who have a common interest in the derivation and in the use of water, or in the improvement or drainage of lands, may unite in an association, with a view of providing for the exercise, the preservation, and the defense of their rights. The union of those concerned and the rules of the society must be fixed in writing.

ART. 658. The association having been constituted, the resolutions of the majority, within the limits and according to the rules laid down in the respective regulations, shall have effect according to article 678.

ART. 659. The formation of such an association may also be decreed by the judicial authority on the demand of the majority of those interested, the others having been fully heard, when it is a case of the exercise, the preservation, or the defense of common right, of which it is impossible to make a division without serious damage. In such a case the regulations proposed and resolved on by the majority are subject to the approval of the judicial authority.

ART. 660. A dissolution of the association can only take place when resolved on by a majority exceeding three fourths, and when a partition may be effected without serious damage, and when it shall have been demanded by some of those interested.

ART. 661. In all else the rules established by the commune, the society, or the division, are observed by all associations.

Section Fourth—Of the Manner in which Servitudes are Extinguished.

ART. 662. A servitude ceases when things arrive at such a state that it cannot be used.

ART. 663. A servitude is revived when things are reëstablished in a condition such that it can again be exercised, saving when time sufficient shall have elapsed to extinguish the servitude.

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ART. 666. A servitude is extinct when not exercised for a space of thirty years.

ART. 667. The thirty years, in the case of a discontinuous servitude, commences to run from the day on which it ceased to be exercised, in the case of a continuous servitude, from the day in which is made an act contrary to the servitude.

ART. 668. The method of the servitude is prescribed in the self same manner that the servitude itself is prescribed.

ART. 669. The existence of vestiges of works, by which had been practiced a taking of water, is not an impediment to prescription; for to impede this the existence and conservation in a serviceable state of the works made for the taking must be reëstablished, as well as the canal of derivation.

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TITLE IV.

Of Community of Property.

Art. 673. The community of property, in default of conventional forms or accepted terms, is regulated by the following rules.

Art. 674. The proportion of participation in a community shall be presumed to be equal unless the contrary is proven. The assembly of participants, as well in the advantages as in the value of common rights, shall be in proportion to their respective interests.

Art. 675. Each part owner may make use of common property, provided its employment aid the purpose for which it is intended, and be not at variance with the interests of the community, or in a manner which would impede other participants in the exercise of their rights.

Art. 676. Each part owner has the right to compel the others to contribute with himself to the expense necessary for the conservation of common property, except the directory release them or they release themselves by an abandonment of their rights as joint proprietors.

Art. 677. No part owner may make any change relative to common property, although it appears to him to be of advantage to all, if the others do not consent.

Art. 678. For the administration and better enjoyment of common property, the decisions of a majority of the part owners shall also be binding on the dissenting minority. There is no majority, except when the votes forming it in the deliberations represent the major part of the interests which are the object of the common property. If a majority cannot be obtained, or if their deliberations may result seriously to the prejudice of common property, the judicial authority may look into the matter, and if necessary, also appoint an administrator of its use.

Art. 679. Each part owner has full title to his part quota of lands in the association, and a proportionate use and benefit of the whole common property. Each may freely alienate, cede, or hypothecate his part, and also grant its use to others if no personal rights are infringed upon. But the effect of this alienation or hypothecation is limited to the portion which would be under separate control of the participant.

Art. 680. The creditors or grantees of a part owner, may oppose a division which is being made without their consent, and may interfere at their own expense, but cannot impugn a consummated division, except in case of fraud, or a division executed notwithstanding a formal protest, and saving always to these the application of the rules of debtor or creditor.

ART. 681. No one can be forced to remain in community of property, and neither can any one of the part owners demand a disorganization. Nevertheless, a contract which makes anything part of a community property for a fixed period, not more than ten years, is valid. Judicial authority, however, provided weighty and urgent circumstances require it, may order a withdrawal from common property even before the agreed time.

ART. 682. [Specially relates to common pastures.]

ART. 683. The withdrawal of community property cannot be demanded by the owners of any part whose segregation would render the whole unfit for the purposes for which it was intended.

ART. 684. The rules concerning the distribution of inheritance are applicable to the division of common property among the owners.

APPENDIX III.

GENERAL LAW OR CODE OF SPAIN*

SPECIALLY RELATING TO

WATER-COURSES, WATERS, AND IRRIGATION.

TITLE I.

OF THE DOMINION OF TERRESTRIAL WATERS.

CHAPTER I—*Of the Dominion of Rain Waters.*

ARTICLE 1. To the owner of a property belong the rain-waters which fall in the same, and during the time they run through it. He may, in consequence, construct, within his own possessions, tanks, reservoirs, cisterns, or ponds to conserve them, or use any other adequate means, always provided that it does not cause injury to the public or to third parties.

Those are regarded as rain-waters, for the purposes of this law, which proceed directly from rains.

ART. 2. There are of the public domain the rain-waters which run through ravines or shallow washes, whose channels may be on the public domain.

ART. 3. A municipal council, giving notice to the governor of the province, can grant authority, to him who applies for it, to construct on the public lands within its municipal estate and jurisdiction, cisterns or tanks to collect rain-waters.

When the permission of a municipal council is refused, the applicant can appeal to the governor of the province, who shall finally determine the matter.

CHAPTER II—*Of the Dominion of Living Waters, Springs, and Streams.*

ART. 4. There are public or of the public domain:

First—The waters which rise perennially or intermittently upon lands of the said public domain.

*Promulgated June 13, 1879, and taking the place of the General Law of Waters of August 3, 1866.

Second—Those, continuous or intermittent, of springs and small streams which flow through their natural channels.

Third—The rivers.

ART. 5. As well on the lands of private persons, as on those the property of the state, the provinces, or of the towns, the waters which rise on them continually or intermittently, belong to the respective owners, each for his own use and employment, while they run through his property.

With regard to the waters not usefully employed, passing from the property where they rise, they immediately become public by virtue of the present law. If, after having passed out of the property where they rise, they enter naturally to run through another of private ownership, either before coming to the public channels or after having run through them, the owner of said property may usefully employ them casually, and the one immediately below, if there should be one, and in this manner, the owners successively, in obedience, however, to that which is prescribed in the second paragraph of Article 10.

ART. 6. Every casual employment of the waters of springs and small streams in natural channels, may be fully effected by means of work by the owners of the properties situated lower down, always provided that they do not make use of barriers other than of earth and loose stone, and that the quantity of water consumed by each one of them does not exceed ten litres (0.353 cubic feet) per second of time.

ART. 7. The order of preference for the casual employment shall be the following:

First—The properties through which the waters run before their incorporation with the river, maintaining the order of their proximity to the head of the streams, and preserving their right to the casual employment in the entire length of each property.

Second—The properties fronting or contiguous to the channel, in the order of proximity to the same and preferring always those highest up.

But it is understood that those lower and bordering properties, which shall have anticipated the utilization by a year and a day, cannot be deprived of it by another, although this may be found situated higher up on the course of the water; and that no casual employment can interrupt nor attack rights previously acquired over the same waters in a lower district.

ART. 8. The right to usefully employ indefinitely the waters of springs and small streams, is acquired by the owners of lower lands, and, in their order, of those contiguous to the channel, when they shall have utilized them without interruption, for a term of twenty years.

ART. 9. The waters not usefully employed by the owner of the property where they rise, as well as those which are more than is required for their employments, shall go out from the property at

the point of their natural and accustomed channel, unless they can be in some manner led off in the course by which they have originally been taken out. The same is understood for the property immediately below, in relation to the following, observing always this order.

ART. 10. If the owner of a property, whence a natural spring flows, does not employ more than the half, the third part, or other fractional portion of its waters, the residue or surplus comes within the conditions of Article 5, in regard to utilizations lower down.

When the owner of a property, whence a natural spring flows, does not usefully employ more than a fractional and fixed part of its waters, he shall continue, in seasons of drought and lowering of the spring, to use and enjoy the same absolute quantity of water, and the loss shall be the misfortune and damage of the irrigators and users lower down, whatever may be their title to enjoy it.

In consequence of what is ordered here, the properties situated lower down, and those bordering in their turn, shall acquire in the order of their location the option to usefully employ these waters and to strengthen their right by the uninterrupted use of them.

But it is understood that, in these lower or bordering properties, he who shall anticipate, or should have anticipated by a year and a day the use of the water, cannot be deprived of it by another, even when he should be situated higher up on the course of the water.

ART. 11. If, after twenty years, counting from the day of the promulgation of the law of the third of August, 1866, the owner of the property where waters rise naturally, should not have used them, wasting them wholly or partially in any manner whatever, he shall lose all right to interrupt those using or applying the same waters lower down, who for the period of a year and a day consecutively may have used them.

ART. 12. There belong to the State the waters found in the site of the construction of public works, though the works were executed by a grantee, nothing to the contrary having been stipulated in the concession. Nevertheless, they shall enjoy the gratuitous use of these waters, as much for the service of the construction as for that of the operation of the same works.

ART. 13. There belong to the towns, the surplus waters of their fountains, sewers, and public establishments. But if they should have been employed by the owners of the lower lands during the period of twenty years, by virtue of concessions from the municipal councils, or by their tacit consent, the course of these waters can not be changed, nor can the continuation of the employment of them be hindered, except on account of public utility duly proved, and after indemnification for damages and injuries.

When temporarily, by reason of greater consumption, droughts, or works, it may be necessary to have surplus waters, those who use them have not the right to be indemnified, even when they

have them by virtue of a concession, unless that for this they may lose their right to these surplus waters when these causes cease.

ART. 14. As well in the case of Article 5 as in that of Article 10, always provided that twenty years have transpired from the publication of the law of 1866, should the owner of the property in which waters spring, after having commenced to use them all or in part, discontinue his employment for the period of one consecutive year and a day, he shall lose the control to all, or to the part of the waters not employed, the right being acquired by those who shall have utilized them for the equal period of a year and a day, according to Articles 10 and 18.

Nevertheless, the owner of the property where the waters rise, shall always preserve the right to use the waters within the same property, as a motive power or for other uses which do not produce an appreciable waste in the quantity, or alteration in the quality of the waters, prejudicial to the established uses lower down.

ART. 15. The control of mineral waters which run through public channels, pertains, in the same manner as that of common waters, to the owners of the lands in which they rise, and they are for the casual and final employment of the owners of the lower properties and those fronting on the channels, according to that which is ordered in the former articles of this chapter.

For the purposes of this law, mineral waters are understood to be those which hold in solution useful substances for industry generally, whatever may be their nature.

ART. 16. The control of mineral-medicinal waters are acquired by the same means as those to surface or subterranean waters: belonging to the owner of the property on which they rise if he utilizes them, or to the discoverer if he shall apply them, subject to the sanitary regulations. The distances to be observed in the exploration of these special waters, by means of ordinary wells, shafts, and galleries, and artesian wells for rising waters, shall be the same as established for common waters.

Out of consideration for the public health, the government—the provincial council, the sanitary council, and the council of state approving—can declare the compulsory condemnation of mineral-medicinal waters, when not already employed for healing purposes, and of the adjacent lands which are necessary for forming bathing establishments, granting, however, two years preference to the owners to examine the project for themselves.

CHAPTER III—*Of the Dominion of Dead or Stagnant Waters.*

ART. 17. Lakes and marshes formed by nature and covering public lands are of the public domain.

Lakes, marshes, and ponds formed on the lands of their respective estates, belong to private individuals, to the municipalities, to the provinces, and to the state. Those situated on lands of common profit belong to the respective towns.

CHAPTER IV—*Of the Dominion of Subterranean Waters.*

ART. 18. Subterranean waters belong to the owner of a property, in full proprietorship, who shall have obtained them on it, by means of ordinary wells.

ART. 19. All proprietors may freely open ordinary wells to raise water within their own properties, though a diminution of the waters of their neighbors result from them. Nevertheless, the distance of two metres between well and well, within the towns, must be preserved, and fifteen metres in the country, between the new excavation and the wells, tanks, fountains, and permanent canals of neighbors.

ART. 20. For the purposes of this law, ordinary wells are understood to be those which are opened with the exclusive object of accommodating domestic use or the ordinary necessities of life, and those which in the extraction of the water do not employ on the apparatus any other motor than a man [manual power?].

ART. 21. The authorization to open ordinary wells, or draw-wells on the public lands, shall be granted by the administrative authority, in whose charge is found the management and police of the land. He who shall obtain it, shall acquire full ownership of the waters which he may find. In opposition to a resolution which has issued, recourse can be had, on appeal, before the superior hierarchical authority.

ART. 22. When the development of subterranean waters is sought by means of artesian wells, or by shafts or galleries, he who finds them, and causes them to rise to the surface of the earth, shall be the owner of them forever, without losing his right though they run away from the property where they were discovered, whatever may be the direction which the discoverer wishes to give them while he maintains their control.

If the owner of the discovered waters should not construct a channel to conduct them through the lower properties which they might cross, and permits them to take a natural course, then the owners of these properties shall commence to enjoy the casual rights which are conferred by articles 5 and 10 in relation to natural upper springs, and the final right which article 10 establishes, with the limitations fixed in articles 7 and 14.

ART. 23. The owner of any land may search for and fully appropriate by means of artesian wells, or by shafts or galleries, the waters which exist under the surface of his property, provided he does not divert or remove public or private waters from their natural course.

When, in consequence of the works of an artesian well, shaft, or gallery, a result is threatened which will divert or diminish the public or private waters due to a public service, or to a preëxisting private employment by rights legitimately acquired, the *alcalde*,

officially, on the motion of the municipal council in the first case, or by means of information from those interested in the second case, may suspend the works. The decision of the *alcalde* shall be final, if not opposed within the legal term before the governor of the province, who shall then dictate the decision that goes out, previously hearing those interested, and statements and expert opinions.

ART. 24. The works for developments treated of in the preceding article, shall not be executed within a less distance than 40 metres of another's house, nor of any railroad or high road, nor at a less distance than 100 metres from any other exploration or fountain, river, canal, ditch, or public watering place, without the proper permission of the owners, or in their case of the municipal council, before the formation of the final project; nor within the site of fortified posts, without permission of the military authority.

Neither can the said works be executed within the boundaries of a mineral location, without previous agreement for compensation of losses. In the case in which there should be no agreement, the administrative authority shall fix the conditions of indemnification, having first obtained the opinion of experts appointed for the purpose.

ART. 25. Concessions of lands of the public domain, for the purpose of exploring for subterranean waters by means of galleries, shafts, or artesian wells, may be granted by the administration, always taking care of everything relating to the control, the limitations of propertyship and useful employment of the waters discovered, subject to that which the present law prescribes in respect to these particulars. Lands of the public domain can only be granted for these subterranean explorations, whose surface or soil has not been granted for a different purpose, unless that both may be compatible. In the regulation for the execution of this law rules shall be established which must be followed in the legal proceedings of this class of concessions, in order to leave without injury, the preëxisting instances of useful employment of the water which have rights legitimately acquired, whether they may be of public or private interest.

ART. 26. The grantees of mining locations, shafts, and galleries for the drainage of mines, shall have the ownership of the waters found in their works, during the time their respective mines are held by them, with the restrictions treated of in the second paragraph of Article 16.

ART. 27. In the extension and preservation of old mining works in search of water, the distances shall continue to be preserved which governed for their construction and operation in each locality, always respecting acquired rights.

TITLE II.

Of Beds or Channels of Waters, of Banks and Margins, of Accretions, and of Works for Protection and for the Drainage of Lands.

Chapter V—*Of Beds or Channels, Banks, Margins, and Accretions.*

Art. 28. The natural bed or channel of the intermittent streams formed by rain-waters, is the land which they cover during their ordinary floods in the ravines or shallow washes, which serve to receive them.

Art. 29. The channels referred to in the former article, which run through lands in private ownership, are private property.

Art. 30. The channels which do not belong to private property, are of the public domain.

Art. 31. The private ownership of the beds of rain-waters, does not authorize cultivations to be made in them, nor works to be constructed, which would change the natural course of the waters, to the injury of other parties, or whose destruction by the force of the floods might cause damage to landed properties, factories or establishments, bridges, roads, or towns situated lower down.

Beds, Banks, and Margins of Rivers and Small Streams.

Art. 32. The natural bed or channel of a river or of a small stream, is the land which its waters cover in the greatest ordinary floods.

Art. 33. The beds of all small streams belong to the owners of the cultivated grounds and of the lands which they cross, with the restrictions which Article 31 establishes in relation to the beds of rain-waters.

Art. 34. There are of the public domain:

First—The beds or channels of the small streams, which are not included in the former article.

Second—The beds or natural channels of rivers, to the extent which their waters cover at their greatest ordinary flood swells.

Art. 35. The banks are understood to be the lateral borders of the beds of rivers, included between the level of their lowest waters and that which these reach to in their greatest ordinary floodings; and the margins are the lateral zones which are contiguous to the banks.

Art. 36. The banks, even when they may be private property by virtue of ancient law or custom, are subject in their whole extent, and the margins in a zone of three metres, to the servitude

of public use, in the general interest of navigation, flotation, fishing, and salvage. Nevertheless, when the accidents of the land or other legitimate causes require it, the zone of this servitude shall be expanded or contracted, conciliating as far as possible all interests. The regulation shall determine when, in what cases, and in what manner, the distances designated in this article can be changed.

Beds and Borders of Lakes, Marshes, and Ponds.

ART. 37. The bed or bottom of lakes, marshes, or ponds, is the land which the waters occupy, in these, at their greatest ordinary height.

ART. 38. The beds of the lakes, marshes, and ponds, which do not belong to the state, to the provinces, or to the municipalities, or which by special title of possession may be private property, belong to the owners of the contiguous lands.

ART. 39. The shores of navigable lakes, which are cultivated, are subject to the servitude of salvage in case of shipwrecks, in the terms established in the law of harbors, in respect to the properties bordering on the sea, and to the embarking, disembarking, depositing boats, and other operations for the service of navigation at points which the authorities designate.

Accretions and Abrasions by Waters.

ART. 40. The lands which may have been occasionally inundated by the waters of lakes, or by brooks, rivers, or other streams, will continue to be the property of their respective owners.

ART. 41. The channels of rivers which have been abandoned by a natural variation of the course of the waters, shall belong to the owners of the bank lands in all their respective lengths. If the abandoned channel separates the properties of different owners, the new line of division shall run equi-distant between them.

ART. 42. When by a navigable or floatable river naturally changing its course, a new channel is opened on private property, this channel shall enter into the public domain. The owner of the property shall recover his submerged land should the waters return to their former channel, and leave it dry either naturally or by works legitimately authorized for that purpose.

ART. 43. The public channels which remain dry in consequence of works authorized by special concession, belong to the grantees, should there be nothing established in the conditions according to which this has been effected.

ART. 44. When the current of a brook, torrent, or river segregates from its bank a known portion of land, and carries it to the properties opposite or to those lower down, the owner of the land

which the segregated bank bordered retains the ownership of the parcel carried away.

ART. 45. If a known portion of land segregated from a bank becomes insulated in a channel, it continues to belong unconditionally to the owner of the land from whose bank it was carried off. The same shall happen when a river dividing into smaller channels, surrounds and insulates any lands.

ART. 46. The islands, which are formed in the rivers by successive accumulations from upper abrasions, belong to the owners of the margins or borders nearest to each, or to those of both margins if the island shall be situated in the middle of the river, they having divided it longitudinally into halves. If an island thus formed be further from one margin than from the other, it shall belong solely and entirely to the owner of the nearest margin.

ART. 47. The increase which lands gradually receive by deposits and sediments of waters, belong to the owners of such lands bordering on brooks, torrents, rivers, and lakes. The mineral deposits of waters, which could be made useful as such, shall be petitioned for, according to the legislation for mines.

Floating and Submerged Articles of Property.

ART. 48. Any one who may recover and save animals, timber, fruit, furniture, and other industrial products, carried away by the current of public waters, or submerged in them, shall immediately deliver them to the local authority, who shall order their storage, or sale at public auction when they cannot preserve them. The discovery shall be announced in the same town, and those adjoining it above, and if within six months reclamation shall be made on the part of the owner, the article or its price shall be given to him, he first paying the costs of keeping, and the tax for salvage, which tax shall be ten per cent. The above period having elapsed, without the owner having reclaimed it, he shall lose his right to it, and all of it shall be restored to the one who found it, he first paying the costs of keeping.

The provisions of the previous paragraph shall cease to hold good from the moment that the owner of the objects shall provide for their salvage.

ART. 49. The brushwood, branches, and timber which may be floating in the waters, or may be deposited by them in the channel, or on the lands of the public domain, belong to the first person who takes them; those stranded on the lands of private ownership, belong to the owner of the respective properties.

ART. 50. The trees uprooted and carried away by the current of the waters belong to the owner of the land where they happen to stop, if they are not reclaimed within one month by their former owners, who must pay the costs occasioned in collecting the trees and putting them in a safe place.

ART. 51. The articles submerged in the public channels continue to belong to their owners, but if at the expiration of one year, they do not remove them, they shall belong to the persons who recover them, first obtaining the permission of the local authority.

If the objects submerged offer an obstruction to the currents, or to the navigation, a reasonable period shall be granted by the authorities to the owners, which having passed without using their right, proceedings shall be taken for their extraction as though they were abandoned.

The owner of the objects submerged in the waters of private ownership, shall ask of the owner of the waters permission to take them out, and in case of refusal, the local authority shall grant it, previously fixing the guarantee for damages and injuries.

CHAPTER VI—*Of Works of Defense against Public Waters.*

ART. 52. The owners of properties conterminous with public channels have liberty to make defenses against the waters on their respective margins by means of plantations, palisades, or revetments, whenever they may think it useful, giving timely notice thereof to the local authority. Nevertheless, previous notice having been given, the administration can order such works to be suspended, and even return the things to their former condition, when by these circumstances they threaten to cause injuries to navigation, or floatage of the rivers, divert the currents from their natural course, or produce inundations.

ART. 53. When plantations, or any work of defense that is planned, may invade the channel, they cannot be executed on navigable or raftable rivers without previous authorization from the minister of public works, and on the other rivers from the governor of the province, always according to that which is provided in the regulation of this law.

ART. 54. In channels where it is suitable to construct defensive works costing little, the governor shall grant a general authorization, in order that the owners of the bordering properties, each one in that part of the channel contiguous to his own bank, can construct them, but subjecting them to the conditions which are fixed in the concession, in order to prevent any proprietor from causing injury to others, and according to that which is determined in the regulation.

ART. 55. When the works projected may be of some importance, the minister of public works, on the application of those who have proposed them, can compel all the proprietors who may be benefited by them to pay the costs, always provided that the majority of them give their consent, computing by the amount of property which each one represents, and that the common utility which these works may subserve shall be completely and scien-

tifically shown. In such case each one shall contribute to the payment according to the benefits which he receives.

ART. 56. Whenever, in order to prevent or control imminent inundations, it may be necessary in case of urgency, to erect temporary works, or to destroy those existing, on all classes of properties, the *alcalde* can sanction the act at once upon his own responsibility; but with the understanding that the losses and injuries occasioned shall be indemnified, fixing the interest at five per cent per annum, from the day on which the damage was caused, until the indemnity has been satisfied. The payment of this indemnity shall be made respectively by the state, the municipalities, or the private individuals, to whom the property threatened by the inundation belongs, and whose defense had occasioned the losses for which indemnity is due, and subject to the prescriptions of the regulation.

ART. 57. The works of general interest, provincial or local, necessary to defend towns, territories, roads, or public establishments, and to promote the scouring and keeping clear of navigable and floatable rivers, shall be marked out and paid for by the administration, according to that which is prescribed in the general law of public works. The examination and approbation of the plans relative to this class of works belongs to the minister of public works, who shall authorize the execution of the same, after the procedures which shall be determined in the regulation for the execution of the present law.

ART. 58. The minister of public works shall direct what shall be the study of the rivers, in order to ascertain the best régime of the currents, as also the navigable and floatable divisions, the gauging of their currents, and the means to avoid inundations, to fix the points where it is suitable to make works for scouring, to reclaim overflowed lands, and to maintain rapid navigation and flotation.

ART. 59. The minister of public works shall also direct that those parts, basins, and watersheds of the rivers shall be studied which are suitable to maintain foresting communities in the interest of the good regimen of the waters.

CHAPTER VII—*Of the Drying of Swamps and Marsh Lands.*

ART. 60. The owners of swamps, or marshy or flooded lands, who may wish to dry or reclaim them, having obtained the proper authorization, may take from the public lands, the stone and earth, which are considered indispensable for the embankments, and other works.

ART. 61. When swamps or marshy lands belong to various owners, and a piecemeal reclamation being impossible, some of them propose to effect it in common, the minister of public works can compel all of the proprietors to pay collectively for the works designed for this object, provided that the majority approve, under-

standing as such, those who represent the major part of the area of the reclaimable land. If any of the proprietors should object to the payment, and prefer to grant to the other owners their part of the reclaimable land, it can be done by means of suitable indemnification.

ART. 62. Whenever, on any account, a swamp, or marshy, or inundated tract is declared to be unhealthful, its drying or reclamation shall be carried out compulsorily. If it should be private property, the decision shall be made known to the owners, in order that the drainage or reclamation can be arranged within the time which is determined for it.

ART. 63. If the majority of the owners refuse to carry out the works for drying, the minister of public works can grant the privilege to any private person or company who may offer to carry it to the end, first having obtained the approval of a suitable plan. The land reclaimed shall become the property of whoever has carried out the drainage or reclamation, only paying to the former owners the sum corresponding to the tax valuation.

ART. 64. In case that the owners of the marshy lands declared to be unhealthful do not wish to execute the reclamation, and there may be no private person or company who offer to carry it to the end, the state, the province, or the municipality can execute the works, paying for them with the funds which for this purpose are included in their respective estimates, and in each case, according to the general law of public works. When this is done, the state, the province, or the municipality shall enjoy the same benefits which the former article determines, in the mode and form that in it is established, remaining consequently subject to the rules which are dictated for this class of property.

ART. 65. If the marshes, lakes, or flooded lands declared to be unhealthful belong to the state, and a proposition is presented offering to dry or reclaim them, the author of the proposition shall become the owner of the reclaimed lands, after having executed the works according to the approved plan. If two or more propositions are presented, the question of competition shall be decided according to articles 62 and 63 of the general law of public works.

ART. 66. The applicant for the drying or reclamation of lakes, marshes, or inundated lands belonging to the state, to a community, or to private individuals, may demand, if it is proper, the declaration for public utility.

ART. 67. The rules contained in the general law of public works, relative to the authorizations for investigations and the rights of those who obtain them, the declaration for public utility, the obligations of the grantees, the lapsing of the concessions, and the examinations of works executed for the useful employment of public waters, are applicable to the authorizations granted to private projectors of the drying of marshes and inundated lands,

without prejudice to the special concessions which are established for each case.

ART. 68. The lands reduced to cultivation by means of drying or reclamation, shall enjoy the privileges of those newly irrigated.

TITLE III.

OF THE SERVITUDES ON THE SUBJECT OF WATERS.

CHAPTER VIII—*Of the Natural Servitudes.*

ART. 69. Lower lands are subject to receive the waters which naturally and without the work of man flow from those higher up, as well as the stones or earth which they drag along in their course. But if the waters are produced by artificial diggings, or the surplus of irrigating canals, or proceed from industrial establishments which had not acquired this servitude, the owner of the lower property shall have the right to exact compensation for damages and injuries. The owners of lower properties or establishments can refuse to receive the surplus of the industrial establishments which drag down or carry in solution noxious substances introduced by the owners of them.

ART. 70. If in any one of the cases of the preceding article, which confers the right of compensation on the lower property, it should be convenient to the owner of it, to give a direct outlet to the waters, in order to free himself of the servitude without prejudice to the owner above, or to third parties, he can do so at his own cost, as well as employ casually the waters if it suits him, renouncing in the meantime the compensation.

ART. 71. The owner of the lower or serving property, also has the right to make, within it, ditches, embankments, or walls, which, without impeding the course of the waters, will serve to regulate them, or to usefully employ them as the case may be.

ART. 72. In the same manner the owner of the upper or dominant property, may construct, within it, ditches, embankments, or walls, which, without increasing the servitude of the lower property, will check the current of the waters, keeping back the vegetable soil which they drag along with them, causing injuries to the land.

ART. 73. When the owner of a property changes the outlet of the waters proceeding from an artificial source, according to articles 21 and 68, and with them causes damage to a third party, the latter can exact indemnification or compensation. It shall not be considered a damage to cut off or prevent the employment of surplus waters by those who only enjoyed them casually.

ART. 74. When the water deposits on an estate stones, earth, brushwood, or other objects, which, obstructing its natural course, may produce inundations by overflowings, diversion of the waters, or other damages, those interested can require the owner of the property to remove the obstruction, or permit them to remove it. If there should be occasion for compensation for damages, it shall be at the charge of whoever caused them.

CHAPTER IX—*Of the Legal Servitudes.*

Section First—Of the Servitude of Right-of-Way for Water.

ART. 75. The enforced servitude for a conduit can be imposed for the conveyance of waters intended for any public service, which does not require expropriation of lands. It is the duty of the minister of public works, to decree the servitude for works at the charge of the state, and to the governor of the province, for the provincial and municipal works, according to the procedures which the regulation prescribes.

ART. 76. If the conduit should have to cross the communal roads, the permission of the *alcalde* shall be given; and when it is necessary to cross public roads or channels, the governor of the province shall grant it, in the form which the regulation prescribes. When it should be necessary to cross navigable canals, or navigable and floatable rivers, the permission of the governor shall be given.

ART. 77. Enforced servitude for a water conduit can also be imposed for objects of private interest in the following cases:

First—The establishment or increase of irrigation.

Second—The establishment of baths and factories.

Third—The drying of swamps and marshy lands.

Fourth—The escape or outlet of waters proceeding from artificial openings.

Fifth—Outlets for running and drainage waters.

In the first three cases the servitude can be imposed not only for the conveyance of the necessary waters, but also for the escape of the surplus.

ART. 78. In the cases of the former article, it is the duty of the governor of the province to authorize and decree the servitude for a water conduit. Those who suffer injuries from the decisions of the governor can interpose the recourse of a hearing before the minister of public works, within the term of thirty days, and to appeal in turn to the administrative courts, conforming to that which is established in article 251.

ART. 79. The proceedings to prove the utility of that which is intended to be imposed, shall in every case precede the decree for the establishment of the servitudes, by hearing the owners of the properties, and those of the municipalities or provinces through

which they radiate, who have to suffer the burden, in whatever the decision affects them or the state.

ART. 80. The owner of the land over which it is intended to impose the enforced servitude for a water conduit, can oppose it for either of the following causes:

First—That he who applies for it is not the owner or grantee of the water or of the land on which he intends to use it for objects of private interest.

Second—That it can be established over other properties with equal advantage for him who attempts to impose it, and with less inconvenience to him who has to suffer it.

ART. 81. If the opposition is raised on the first of these causes which are expressed in the former article, and it is accompanied by documentary evidence of its existence, the course of the administrative proceeedings shall be suspended until the ordinary tribunals shall decide the question of ownership.

If the opposition should be on the second category or made in the other manner, it shall be conducted and determined by hearing those interested. In every concession for a servitude the invocation of administrative court proceedings shall be understood to be reserved for those persons whose rights are affected by the inconvenience.

ART. 82. When, for objects of public interest, the imposition of enforced servitude for a conduit is solicited by private persons, the procedure of the petitioners shall be conducted in the manner which the regulation for the execution of the present law provides.

ART. 83. The enforced servitude for a conduit cannot be imposed for objects of private interest, upon buildings, nor upon gardens or orchards existing at the time of making the petition.

ART. 84. Neither can the enforced servitude for a conduit be located through another preëxisting conduit; but if the owner of it consents, and the owner of the serving property refuses, the proper proceedings shall be instituted to compel the owner of the property to submit to the new inconvenience, previous indemnification being made if it occupies a larger part of the land.

ART. 85. When an irrigated tract of land which receives the water from only one point, is divided by means of inheritance, sale, or any other title, between two or more owners, those of the upper parts are obliged to give passage to the water as a servitude of aqueduct for irrigation of the lower parts, without being able to exact indemnification for it, having stipulated nothing to the contrary.

ART. 86. The enforced servitude for a water conduit may be established:

First—With an open ditch, when it shall not be dangerous on account of its depth or situation, nor shall offer any other inconvenience.

Second—With a covered ditch, when its depth shall require it, its proximity to buildings or roads, or for any other similar reason, in the opinion of the competent authorities.

Third—With tubes or pipes, when other waters already appropriated can be absorbed, when the waters conveyed can be infected by others, or absorb noxious substances, or cause damage to works or buildings; and always provided that from the measure the necessary results follow for the purpose for which it was intended.

ART. 87. The enforced servitude for a conduit can be established temporarily or perpetually. It shall be considered by the effects of this law perpetual, when its duration exceeds six years.

ART. 88. If the servitude should be temporary, the double of the rent corresponding to the duration of the inconvenience, shall be previously paid to the owner of the land, for the part which has been occupied, with the addition of the amount of damages and injuries to the rest of the property, including those which proceed from its division by the interposition of the conduit. Moreover, it shall be the duty of the owner of the dominant estate to replace things in their former condition, the servitude having terminated. If it should be perpetual, the value of the land occupied shall be paid, and that of the damages and injuries which have been caused to the rest of the property.

ART. 89. A temporary servitude cannot be prolonged, but it may be converted into a perpetual one, without the necessity of a new concession, the grantee paying what is established in the former article, previously deducting that which was paid for the temporary servitude.

ART. 90. All the works necessary for the construction, preservation, and cleaning of the conduit, shall be paid for by him who has applied for and obtained the servitude. For this purpose, he is authorized to occupy temporarily the land indispensable for the deposit of materials, previously paying for damages and injuries, or giving sufficient security in case of their not being easily ascertained, or that those interested do not agree to them. These or the administration can compel him to execute the necessary works and cleaning in order to prevent stoppages or filtrations which produce deteriorations.

ART. 91. On establishing an enforced servitude for a conduit, the width which the canal and its margins ought to have shall be fixed in consideration of the nature and configuration of the land, according to the quantity of water which it will have to carry.

ART. 92. To the enforced servitude for a conduit, the right of passage on its margins for its exclusive use is inherent.

ART. 93. If the conduit should cross public or private roads, of whatever nature they may be, he who has obtained the concession shall be obliged to construct and maintain the necessary culverts and bridges; and if it should have to cross other conduits it

shall do so in a manner which will not retard or accelerate the flow of the waters, nor diminish their discharge, nor deteriorate their quality.

ART. 94. When the owner of a conduit which crosses the lands of others, petitions to enlarge its capacity so that it will receive a greater quantity of water, there shall be observed the same procedures by which it was established.

ART. 95. The owner of a canal may protect its margins with sods, stakes, walls, or slopes of loose stone, but not with plantations of any kind. Neither can the owner of the servient estate make plantations, nor any operation of cultivation, within the same margins, and the roots which penetrate into them may be cut off by the owner of the conduit.

ART. 96. The servitude for a conduit does not prevent the owner of the servient estate from fencing and inclosing it, as also from building over the conduit itself, in such manner that it does not cause injury to it, nor prevent necessary repairs and cleanings. These, the owner of the conduit shall duly execute, giving previous notice to the owner, tenant, or agent of the servient estate.

If, in order to clear and clean it, it should be necessary to destroy some part of the structure, the cost of its repair shall be at the expense of whoever built it over the canal, in case that he has not left suitable openings or gaps for this service.

ART. 97. The owner of the servient estate may construct bridges over the aqueduct, in order to pass from one to another part of his estate; but he shall make them of the necessary solidity, and in such manner that they do not diminish the dimensions of the conduit, nor obstruct the flow of the water.

ART. 98. In every canal or conduit, the water, the channel, the basins, and the margins shall be considered as an integral part of the property or structure to which the waters are dedicated.

ART. 99. No one can, except in the cases of articles 96 and 97, construct a building or bridge over the canal or conduit of another, nor take water, nor usefully employ the products of it, nor that of its margins, nor utilize the power of the current, without the express consent of the owner.

Neither may the owners of the lands which a canal or conduit passes over, or by whose boundaries it runs, claim the right of possession to the useful employment of its channel or margins, unless founded on titles of property expressive of such right.

If the canal shall have been of immemorial construction, or, from any cause, the width of its channel should not have been fully determined, it shall be fixed according to article 91, when there should be no remains and old vestiges which will prove it.

In the canals belonging to communities of irrigators, that which is prescribed in the municipal ordinances shall be observed, in relation to the useful employment of the streams, and of the channels and margins.

ART. 100. A concession for a legal servitude for a conduit over the lands of others, shall lapse if within the time which should have been fixed, the grantee should not have made use of it, even after having fully satisfied the owner of each serving estate for the value, according to article 88.

A servitude already established shall be extinguished:

First—By consolidation, or by uniting in one person the ownership of the waters, and that of the lands affected by the servitude.

Second—By the expiration of a minimum period of ten years, fixed in the concession for a temporary servitude.

Third—By not using it during the period of twenty years, either from impracticability or negligence on the part of the owner of the servitude, or by acts of the owner of the servient estate contrary to it, without opposition from the owner of the dominant estate.

Fourth—By compulsory alienation on account of public utility.

The use of a servitude for a conduit, by any one of joint owners, preserves the rights of all, preventing prescription by want of use. A temporary servitude for a conduit having been extinguished, by the passing of the time and the maturity of the term, the owner of it shall only have the right to employ the materials in their original condition. The same shall be understood in regard to that of a perpetual right of conduit, whose servitude may have been extinguished by impracticability or disuse.

ART. 101. The urban servitudes for a conduit, canal, fountain, drain, sewer, and other establishments for the public and private use of towns, buildings, gardens, and factories, shall be governed by the general and local ordinances of urban police.

Those proceeding from private agreements which are not affected by the attributes of municipal corporations, are governed by the common laws.

Section Second—Of the Servitude of Abutment for Weirs, for Dams, or for Partitioners.

ART. 102. The enforced servitude for abutments can be imposed when he who intends to construct the weir is not the owner of the banks or the lands where it is necessary to place them, and the water which is intended to be taken by it is intended for a public service, or that of the private interests embraced in article 77.

ART. 103. The concessions for this class of servitudes shall be granted by the administration, in the form and according to the terms prescribed in the first section of this chapter.

ART. 104. The enforced servitude for the abutment of a weir having been determined, the value which is equitable for the occupation of the land shall be paid to the owner of the serving estate or estates, and afterwards they shall be indemnified for the damages and injuries which the lands shall have experienced.

ART. 105. He who, in order to irrigate his land or to improve

it, shall require to construct a dam or partitioner in the canal or irrigating channel from which he has to obtain water, can, if without harm or loss to the other irrigators, require the owners of the margins to permit its construction, first paying for damages and injuries, including those which originate from the new servitude.

ART. 106. If the owners of the margins should oppose it, the *alcalde*, after having heard them and the syndicate intrusted with the distribution of the water, if there should be one, or in default of this, the municipal council, can grant the permission. From the decision of the *alcalde* an appeal can be taken before the governor of the province.

Section Third—Of the Servitude of Watering Places, and of Drawing Water.

ART. 107. The enforced servitudes for watering places and for drawing water can only be imposed for the purpose of public utility, in favor of some town or village, after paying the proper compensation.

ART. 108. Hereafter, these servitudes cannot be imposed on ordinary wells, cisterns, or tanks, nor on buildings or lands inclosed by walls.

ART. 109. The servitudes for watering places, and for drawing water, carry with them the obligation of the serving estates to give passage to persons and cattle as far as the place where they have to use them; requiring ample indemnification, however, for this service.

ART. 110. The rules which have been established for the granting of concessions for the right of way for a conduit, are applicable to the concessions for this class of servitudes. Having made the decree according to its object and the circumstances of the locality, the width of the road or path which is to lead to the watering place or to the point intended for drawing water, shall be fixed.

ART. 111. The owners of the serving estates can change the direction of the road or path intended for the use of their servitudes, but not their width or entrance, and in every case so that the variation will not injure the use of the servitude.

Section Fourth—Of the Servitude for Tow-paths and other things inherent to Riparian Properties.

ART. 112. The properties contiguous to the banks of navigable or floatable rivers are subject to the servitude of a tow-path. The width of this shall be one metre if intended for footmen, and two metres if for horsemen. When the slope of the land or other obstacles require it, the tow-path shall be opened through the route most convenient; but in this case, and always when the road

passes through the adjacent properties, more than the zone marked out for the tow-path, the owners of them shall be paid the value of the land which it occupies.

ART. 113. The government, in classifying the navigable and floatable rivers, shall determine the margin of the same, in every situation, on which the tow-path may be taken.

ART. 114. On the rivers which hereafter shall acquire navigable or floatable conditions, by virtue of works which shall have been executed on them, the corresponding indemnification shall precede the establishment of the tow-path, according to the law of enforced expropriation.

ART. 115. When a river ceases permanently to be navigable or floatable, the servitude for a tow-path shall cease also.

ART. 116. The servitude for a tow-path is exclusively for the service of river navigation and flotation.

ART. 117. For navigable canals, the servitude for a tow-path shall not be imposed, except in the case of its necessity being proved.

ART. 118. Neither plantations, cornfields, hedges, ditches, nor other works or cultivations which obstruct its use, can be made on the tow-path. Nevertheless, the owner of the land can utilize exclusively the underwood and grass which naturally grows on it.

ART. 119. The branches of the trees which present obstacles to navigation or flotation, and to the tow-path, shall be cut off to a convenient height.

ART. 120. The riparian properties are subject to the servitude under which the ropes or cables necessary for the establishment of ferry-boats, are held or made fast, first receiving indemnification for damages and injuries; also, in extreme cases, to consent to the casual fastening of ships or floating objects, also being indemnified for the same.

ART. 121. If, in order to prevent the floods from carrying away timbers or other objects, conveyed by floating in the rivers, it should be necessary to draw them out, and deposit them on the riparian properties, the owners of these cannot prevent it, and only have the right to payment for damages and injuries. For this the timbers or objects shall be specially held as security, and these shall not be removed until their conductors have made payment or given security.

ART. 122. Likewise the riparian properties are obliged to consent, that merchandise discharged and saved in case of damage, either by shipwreck or other urgent necessity, shall be deposited on them, the same being held as security for the payment of damages and injuries in the terms of the former article.

ART. 123. The owners of the margins of the rivers are obliged to allow fishermen to stretch and dry their nets on them, and

deposit temporarily the product of the fishery, without entering into the estates, nor to go more than three metres from the banks of the rivers, according to article 36, unless the accidents of the land require in some cases the fixation of a greater width. Where the servitude for passage through the margins does not exist for the common employment of the waters, the governor can establish it, determining its width, the corresponding indemnification having been previously made.

ART. 124. When the channels of rivers or ravines have to be cleared and cleaned of sand, stones, or other objects deposited by the waters, which, by their hindrance, threaten to obstruct or deflect their course, the riparian properties are subject to the temporary servitude and deposit of the materials taken out; the damages and injuries having been paid, or sufficient security given.

ART. 125. The establishment of all these servitudes, including that of passage through the margins of rivers for common utilizations of the waters, in the degrees and extent which have been previously determined for them in the first section of this chapter, is the duty of the administration.

TITLE IV.

OF THE USEFUL EMPLOYMENT OF PUBLIC WATERS.

CHAPTER X—*Of Common Utilizations of Public Waters.*

Section First—Of the Employment of Public Waters for Domestic, Agricultural, and Manufacturing Purposes.

ART. 126. While the waters run through their natural and public channels, all may use them for drinking, washing clothes, vessels and any other objects, for bathing, and watering or washing horses or cattle, subject to municipal police rules and regulations.

ART. 127. In the waters which, artificially removed from their natural and public channels, run through canals, ditches, or open aqueducts, although they pertain to private grantees, all may draw and take in vessels what they require for domestic or industrial purposes, and for the irrigation of isolated plants; but the drawing must necessarily be made by hand, without any kind of machine or apparatus, and without stopping the course of the water or injuring the margins of the canal or ditch. Nevertheless, the authority will limit the use of this right when it causes injuries to a grantee of the waters. It is understood that no one can pass through private property to search for or to use water, without obtaining permission from the owner.

ART. 128. In the same manner, in the canals, ditches, or any uncovered aqueducts of public waters, although temporarily the property of grantees, all can wash clothes, vessels, or other objects, provided that by it they do not injure the margins, and that the use for which the waters are intended does not require that they should be preserved in a state of purity. But they cannot wash nor water cattle or horses, except precisely at the places intended for that purpose.

Section Second—Of the Occupation of Public Waters for Fishing.

ART. 129. All may fish in the public channels, subject to the laws and police regulations which have been especially dictated concerning fishery, provided that they do not hinder navigation and flotation.

ART. 130. In the canals, ditches, or aqueducts for the conveyance of public waters, although constructed by the grantees of the latter, and unless the privilege of fishing has been reserved for them by the conditions of the concession, all may fish with hooks, nets, or baskets, subject to the special regulations for fishing, provided that they do not obstruct the course of the water nor injure the canals or their margins.

ART. 131. In everything which relates to the construction of inclosures made with reeds, or any other kind of apparatus whatever, intended for fishing, as well in the navigable and floatable rivers as in those which may not be, the rulings in force or the laws and regulations which may have been dictated on this subject shall be observed.

ART. 132. The owners of staked inclosures or fisheries, established in the navigable or floatable rivers, shall have no right to compensation for damages which boats or timbers in their navigation or flotation cause them, unless there is on the part of those in charge of them an infringement of the general ordinances, malice, or evident neglect.

ART. 133. In the waters of private property, and in those granted for the establishment of fish-ponds, or for breeding fish, the owners or grantees solely may fish, or those who have obtained permission from them, without other restrictions than those relating to the public health.

Section Third—Of the Utilization of Public Waters for Navigation and Flotation.

ART. 134. The government, after examination, will designate, by means of royal decrees, the rivers which altogether or in part are to be considered navigable or floatable.

ART. 135. The designation of the places for the embarkation of passengers and merchandise on the navigable rivers, and for

the formation and stopping of floats or rafts on the floatable rivers, is a power of the governor of the province, after making examination. The lands necessary for these uses shall be acquired by enforced expropriation, when they are private property.

ART. 136. The works for canalizing or making navigable or floatable the rivers which are not so naturally, will be executed according to that which is prescribed in the general law for public works.

ART. 137. When, in order to convert a river into a navigable or floatable one by artificial means, it may be necessary to destroy factories, dams, or other works lawfully constructed in their channels or on their banks, or to deprive of irrigation or other applications those who by right have enjoyed them, compulsory expropriation and compensation for damages and injuries shall first be made.

ART. 138. The navigation of rivers is entirely free for every class of national or foreign ships, subject to the general and special laws and regulations for navigation.

ART. 139. On the rivers not declared navigable nor floatable, every one who may be an owner of their banks, or obtain permission of those who are, can establish ferry-boats for the service of their estates, or for the use of the industry to which they devote them.

ART. 140. On the rivers merely floatable the conveying of timbers cannot be carried on, except in the seasons which the minister of public works designates for each one of them.

ART. 141. When on the rivers not declared floatable, flotation can be carried on in seasons of great floods, or with the aid of movable weirs, the governor of the province, having previously examined it, can authorize it, provided that it does not injure the irrigations and industrial establishments, and that the petitioners give security for the payment of damages and injuries.

ART. 142. In the navigable or floatable rivers no dam can be constructed without the necessary locks and openings or channels for the navigation and flotation, and salmon fish-ladders in the rivers where they may be necessary for the protection of this class of fish; the maintenance of all these works being at the cost of the owners of them.

ART. 143. On the navigable and floatable rivers the masters of vessels and conductors of movables conveyed by floating, shall be responsible for the damages which they severally occasion.

For passing the bridges, either public or private works, the masters and conductors shall be governed by the rules and ordinances of the authorities. If they cause any injury they shall pay all the expenses which their repair occasions, the accounts being previously proven.

ART. 144. These liabilities shall be as liens on the vessels or floating effects, other sufficient security not having been given, without prejudice to the claim which the owners hold against the masters or conductors.

ART. 145. All the timber and other floating effects which go in charge of the same conductor, even when they belong to different owners, shall be responsible for the payment of the damages and injuries which these same effects cause.

The owner or owners of the timber or other effects, which are arrested and sold in this case, can reclaim from the others the repayment of the part which each one ought to pay, without injury to the claim which all have against the conductor.

ART. 146. The rules in the former article shall be observed also, when by floods or other causes, two or more convoys of timber or floating effects, become so mixed up that it is impossible to determine to which of them the effects causing the damage belong. In such case, they shall be considered as only one convoy, and the proceedings shall be taken against any one of the conductors, for whom, without injury, the right shall be held to reclaim from the others the payment of that which properly corresponds to them.

CHAPTER XI—*Of Special Useful Employments of Public Waters.*

Section First—Of the Concession of Utilization Privileges.

ART. 147. An authorization is necessary for the employment of public waters, dedicating them specially to undertakings of public or private interest, excepting the cases spoken of in articles 6, 174, 176, 177, and 184 of the present law.

ART. 148. He who shall have a recognized right to the public waters of a river or stream, without having made use of them, or having used only a part of them, shall have it preserved intact for the space of twenty years, counting from the promulgation of the law of the third of August, 1866. This time having passed, such rights shall lapse for the part of the waters not usefully employed, without prejudice to that which is laid down by the general rule in the following article. In such case that which is laid down in articles 5, 6, 7, 11, and 14 of the present law is applicable to the farther useful employment of the waters.

For all cases, when the public inquiry for any concession of waters is to be held, the holder of these rights shall be obliged to prove them, in the manner and time which the regulations point out. If compulsory expropriation should be ordered, it shall be carried to an end, the due indemnification being previously made.

ART. 149. He who during twenty years should have enjoyed an useful application of public waters, without opposition from the authorities or third parties, shall continue to enjoy it, even when he cannot prove that he obtained the proper authorization.

ART. 150. Every concession for the useful employment of public waters is understood to be made without injury to third parties, and preserving the rights of private individuals. With respect to the duration of these concessions, it shall be determined in each case according to the regulations of the present law.

ART. 151. Concessions for the useful employment of public waters are understood to include those of lands of the public domain necessary for the works of the dam and for the canals and ditches. With respect to the lands belonging to the state, to the provinces, to the towns or private persons, proceedings shall be conducted according to the rules for imposing enforced servitudes, without prejudice to that which is arranged in article 78; or if expropriation on account of public utility shall be invoked, the proper examinations and other formalities which belong to it shall previously be taken.

ART. 152. In every concession for an useful employment of public waters, its nature, the quantity of water conceded in cubic metres per second, and, if it should be for irrigation, the extent of the land in hectares which may have to be irrigated, shall be fixed. If in employments previous to the present law, the quantity of water should not have been fixed, only that necessary for the object of the utilizations, is understood to be granted, which the minister of public works shall determine by hearing those interested, having the power to require them to establish suitable modules.

ART. 153. The waters conceded for one useful employment cannot be applied to a different one, without the observance of formalities such as are treated of for a new concession.

ART. 154. The administration shall not be responsible for the failure or diminution, which may result in the quantity expressed in the concession, although it may be, that it was occasioned by error or some other cause.

ART. 155. Whenever in the concessions, or in the employments of determined quantities of water for a fixed space of time, no other thing is expressed, the continuous use for every moment of time is understood. If it should be for days, the natural day of twenty-four hours from midnight shall be understood; if it should be during the day or night, it shall be understood as between the rising and setting of the sun, and if it should be for weeks, they shall be reckoned from twelve o'clock on Saturday night; if it should be for feast days, or the exclusion of them, those shall be understood, in which, according to the rule, work cannot be done, considering only as feast days those which were so at the time of the concession or of the contract.

The application of these orders and minute details concerning the manner and time of the enjoyment of the water, are recommended for the administrative regulations, or for the ordinances of the irrigating communities of which chapter 13 treats.

ART. 156. Authorizations for making examinations of all proposed useful employments of water shall be subject to that which is prescribed in article 157 of the general law of public works.

ART. 157. Concessions for special useful employments of public waters, as well as those for drainage and reclamation, shall be ordered, preferring the schemes of the greatest importance and utility, and in equality of circumstances, those which had been first presented. All relative to the projects, privileges, the execution, inspection, and reception of the works which the utilizations require to be the object of the concession, shall be governed by the regulations of the general law of public works.

ART. 158. Concessions for useful employments of water, shall become extinct, by not having complied with the conditions and terms according to which they have been granted.

ART. 159. In all useful employment of public waters for navigable canals or irrigation, ditches, and sanitary improvements, the waterfalls, factories, and industrial establishments which shall have been constructed and erected upon them, shall be the perpetual property of the grantees.

ART. 160. In concessions for special useful employments of public waters, the following order of preference will be observed:

First—The supply of towns.

Second—The supply of railroads.

Third—Irrigations.

Fourth—Canals for navigation.

Fifth—Mills and other factories, ferryboats, and floating bridges.

Sixth—Basins for fish-ponds or fish breeding places.

Within each class, the undertakings of the greatest importance and utility shall have the preference, and, other things being equal, those who shall have first solicited the privilege.

In every case, the common employments of water clearly expressed in sections one, two, and three of the former chapter will be preëminently respected.

ART. 161. Every special useful employment of public waters is subject to enforced expropriation on account of public utility, first paying the proper indemnification, in favor of another useful employment which precedes it, according to the order fixed in the former article, but not in favor of those which follow it, except by virtue of a special law.

ART. 162. In urgent cases of fire, inundation, or other public calamity, the authorities or their subordinates can act summarily, and without process or previous indemnification, but in subjection to ordinances and regulations, for the waters necessary to restrain or to avoid the damage. If the waters should be public, there will be no cause for indemnification, but if they should have been applicable for industrial or agricultural purposes, or should have

been private property, and their diversion should have occasioned appreciable injury, there shall be immediate compensation.

ART. 163. In every concession for canals of navigation and irrigation, or for ditches, as well as for undertakings for drainage and sanitary improvement, the foreign capital which is employed in the construction of the works and the acquisition of the land, remains under the protection of the state, and is exempt from reprisals, confiscations, and seizures on account of war.

Section Second—Of the Useful Employment of Public Waters for the Supply of Populations.

ART. 164. Only when the normal flow of water which a population enjoys should not amount to 50 litres (11 gallons) per day per inhabitant, and of these 20 for drinking purposes, can there be allowed to it, of that intended for other useful employments, the quantity necessary to make up that flow, a proper indemnification having previously been made.

ART. 165. If the population requiring drinkable waters, already uses a quantity of them not drinkable, but applicable to other public and domestic uses, they shall be allowed to make up of the first, twenty litres (4.4 gallons) daily for each inhabitant, in case that the proper indemnification is made, although this quantity, added to that not drinkable, exceeds the fifty litres fixed in the former article.

ART. 166. If the water for the supply of a population is taken directly from a river whose flow may have an owner or owners, those who are deprived of the useful employment of water legitimately acquired, shall be previously indemnified.

ART. 167. The enforced alienation of waters of private ownership, for the supply of a population, cannot be decreed, except where the minister of public works may have decided, in consequence of examinations made for the purpose, that there are no public waters which can be readily applied to the said purpose.

ART. 168. Notwithstanding the provisions of these former articles, the governor of the province, in seasons of extraordinary drought, the provincial commission approving, can sanction the temporary expropriation of the water necessary for the supply of a population, by means of the proper indemnification in favor of private individuals.

ART. 169. When the concession is allowed in favor of a private undertaking, and in case the population which it has to supply should not have the twenty litres of drinking water for each inhabitant (which article 164 speaks of), the tariff of prices which can be received for furnishing the water and pipes shall be fixed in the said concession.

ART. 170. The concessions of which the former article speaks, shall be temporary, and their duration shall not exceed 99 years; which time having transpired, all the works, as well as the pipes, will remain for the benefit of the local community, but with the obligation on the part of the municipal council to respect the contracts between the company and private persons for the supply of water to their houses.

ART. 171. It is the duty of municipal councils to frame regulations for the management and distribution of the waters within the towns, subject to the general administrative provisions. The formation of these regulations must always be prior to the granting of the concessions of which the former articles treat. The concession once being made, the regulations can only be altered by joint concurrence between the municipal council and the grantee. In case there shall be no concurrence, the minister of public works shall determine it.

Section Third—Of the Employment of Public Waters for the Supply of Railroads.

ART. 172. On obtaining competent authority, railroad companies may avail themselves of the public waters which may be necessary for their use. The governor of the province shall grant the authorization, when the amount of water does not exceed 50 cubic metres ($1{,}765\frac{85}{100}$ cubic feet) per day; should the quantity exceed this, the minister of public works shall decide. If the waters should have been previously devoted to other uses, expropriation must precede, according to that which is laid down in article 161.

ART. 173. With the authorization which article 25 of this law prescribes, the companies for the said purpose can open ordinary wells, draw wells, or tunnels, also bore artesian wells on either the public or community lands; and when they should be on private property by first obtaining permission of its owner, and in the other case that of the governor of the province.

ART. 174. When railroads shall cross irrigated lands, on which the right to employ the water may be inherent to the ownership of the land, the companies will have the right to take, at the points most convenient for the service of the railroad, the quantity of water corresponding to the land which they have occupied and paid for, being obliged to pay in the same proportion the fee for irrigation, or to contribute towards the ordinary and extraordinary expenses of the canal, according to the circumstances.

ART. 175. In default of, or by insufficiency of the means authorized in the previous articles, the railroad companies shall have the right, for their exclusive service, to the necessary waters not intended for domestic uses, which are private property, and in such cases the law of enforced expropriation shall be applied.

Section Fourth—Of the Employment of Public Waters for Irrigation.

ART. 176. The owners of properties contiguous to the public roads can collect the rain-waters which run through them, and employ these for the irrigation of their fields, in subjection to that which the ordinances direct for the preservation and police of the same roads.

ART. 177. The owners of properties bordering on the public channels of intermittent flow, as shallow sandy washes, small streams, deeply-cut channels, or others similar of the public domain, can employ in their irrigation the rain-waters which run through them, and construct, for the purpose, without the necessity of authorization, dikes of earth and loose stone, or dams either movable or automatic.

ART. 178. When these dikes or dams can produce inundations, or cause any other injury to the public, the *alcalde*, officially, or at the request of others, the danger being proved, will order that those who constructed them shall modify them as much as may be necessary to remove all fear, or, should it be necessary, that they destroy them. If they threaten to cause injury to private persons, the latter may appeal at once to the local authority; and if the injury is realized, they shall have their rights examined into promptly before the courts of justice.

ART. 179. Those who during twenty years should have employed for the irrigation of their lands, the rain waters which flow through a shallow wash, ravine, or other similar channel of the public domain, can object to the owners of properties higher up depriving them of this advantage. But if they should have employed only a part of the water, they cannot prevent others from using the remainder, provided that the flow for the quantity which they have for a long time employed, remains free.

ART. 180. The provision in the preceding articles, relating to rain waters, is applicable to intermittent springs, which only flow in times of abundant rains.

ART. 181. When it is designed to construct dams, or weirs of permanent character, in order to employ for irrigation the rain waters, or the intermittent springs which run through public channels, the authorization of the governor of the province will be necessary, after due formality.

ART. 182. In order to construct reservoirs intended to collect and conserve rain or public waters, the authorization of the minister of public works, or that of the governor of the province, is necessary, according to the law of public works and the regulations for its execution.

ART. 183. If these works should be declared to be of public utility, they shall have the power to condemn, previously indemni-

fying those who might have acquired rights to usefully employ in their lower course the water which may have to be detained and stored in the reservoir, when the quantity of it, or other circumstances, does not permit it to supply those utilizations in the same degree in which they were formerly.

When it can be proven, said utilizations will be further respected by indemnifying those who, under them, may have rights to damages which its interruption on account of the execution of the works of the reservoir occasions them.

ART. 184. On the navigable rivers, the riparian proprietors can, on their respective margins, freely establish pumps, or any other machine intended to draw the waters necessary for the irrigation of their bordering properties, provided that they do not cause injuries to the navigation. In the other public rivers the authorization of the governor of the province will be necessary.

If in any of the cases of the former paragraph, steam should have to be used as a motive power in effecting the extraction of the water, the authorization devolves on the governor, in virtue of established rules, he making publication in the official bulletin, and hearing those interested.

ART. 185. The authorization of the minister of public works is necessary for the employment of public waters with the intention of irrigation, whose derivation or taking has to be made by means of dams, weirs, or other permanent works, constructed in the rivers, ravines, small streams, or any other class of continuous natural currents, provided that more than 100 litres of water (3.5317 cubic feet) per second may have to be taken.

ART. 186. If the quantity of water which has to be derived or diverted from its natural channel does not exceed 100 litres per second, the governor of the province will make the concession, after the proper formalities, the petitioner having recourse by appeal to the minister of public works. Also, the governors of the provinces may authorize the reconstruction of old dams intended for irrigations or other uses. When the works which may have to be executed on the dams are for preservation, or simple repairs, and do not change the conditions of the employment of the waters, they can be carried to completion without previous authorization, but giving information of them to the governor of the province.

ART. 187. The governors of provinces cannot make more than one concession in the same works of taking, of which a dam forms part.

ART. 188. The concessions of water made to the proprietors of lands, individually or collectively, for the irrigation of these lands, shall be in perpetuity. Those which should be made to societies or companies, to irrigate lands of others, in consideration of the payment of a fee, shall be for a term which shall not exceed 99 years, which having elapsed, the lands shall be exempt from the payment of the fee, and the common ownership of the dams,

ditches, and other works exclusively necessary for the irrigation, shall pass to the community of irrigators.

ART. 189. The applications for concessions of which the former articles treat, shall be accompanied with:

First—The design for the works, composed of plans, full description, specifications, and estimate of cost.

Second—If the application should be by an individual, the petitioner as well as the owner—proof of possession of the lands which he intends to irrigate.

Third—If it should be by several individuals—the agreement of the majority of the proprietors of the irrigable lands, computed by the superficial area which each one represents.

Fourth—If it should be for a society or company—the schedule of rates, either in products or in money, which the lands will have to pay that may have to be irrigated.

ART. 190. When employments of water exist by virtue of recognized and valid rights, a new concession can be made only in case, after gauging the waters in ordinary years, the quantity which is solicited is shown to be a surplus, after completely supplying the existing utilizations. The gauging having been made, the proper time for the irrigations shall be taken into account, in order to determine the quantity of water necessary, according to the lands, cultivations, and irrigable area. In years of drought, the new grantees cannot take the water as long as all the necessities of the ancient users are not supplied.

ART. 191. The gauging of summer waters will not be necessary before making concessions of winter, spring, and torrent waters, which could not constantly or casually be used on the lower lands, provided that the point of diversion is established at the proper height or level, and necessary precautions are adopted in order to prevent injuries or abuses.

ART. 192. When, the public waters of a river running wholly or in part underneath the surface of its bottom, imperceptible to the sight, submerged dams are constructed, or other means are employed to elevate their level, so as to make them applicable to irrigation or other uses, this result shall be considered, under the present law, as a discovery of the water rendered capable of being used. The irrigators and industrial users situated lower down, who by prescription or by concession from the minister of public works should have acquired legitimate title to the use and employment of waters which have thus been made artificially to reappear on the surface, shall have the right to object to and oppose a new discovery higher up, so far as it might cause them injury.

ART. 193. The mills and other industrial establishments, which are injured by the diversion of the waters of a river or rivulet, sanctioned according to that which is arranged in the present law, shall receive in every case, from the grantee of the new work, the corresponding indemnification. This shall consist

of the amount of the injury, as per agreement between the parties; but if there should be no agreement, it shall be determined according to expropriation on account of public utility, after due formalities.

ART. 194. The authorized constructors of canals of irrigation shall enjoy:

First—The power to open quarries, to collect loose stone, to construct kilns for lime, gypsum, and brick, and to deposit articles or to establish workshops for the preparation of materials on the lands contiguous to the works. If these lands shall be public or for common occupation, the companies shall make use of this power according to their necessities; but if they should be private property, they shall arrange previously with the owner or his representative, through the medium of the *alcalde*, and they shall fix equitably the indemnification for the damages and injuries which might happen.

Second—Exemption from fees which are required by the transference of property, occurring by virtue of the law of expropriation.

Third—Exemption from all taxes on the capital which is invested in their works.

Fourth—In the towns within whose limits the construction should have been made, the dependents and operatives of the company, shall have a right to the wood, pastures for the cattle employed on the work, and other advantages which the townspeople enjoy.

The concessions, with subsidies from the state, from a province, or from a municipality, shall always be offered at public auction, according to that which the general law of public works arranges.

ART. 195. During the first ten years, the same taxable valuation shall be estimated for the lands brought under irrigation, which had been fixed in the last assessment in which they were considered as unirrigated, and according to this the taxes and duties shall be paid.

ART. 196. It shall be the duty of the companies to maintain their works in good condition during the term of the concession. If these should become useless for irrigation, the lands shall cease to pay the established water-rate as long as the stipulated amount of water is not supplied, and the minister of public works shall fix a time for the reconstruction or repair. This time having elapsed, without the grantee having complied, and no superior force preventing (in which case it may be extended), the concession shall be declared forfeited. The conditions of the forfeiture shall be those designated in the general law of public works for similar cases, according to the provisions of the regulation of the present law.

ART. 197. As well in concessions granted to proprietors collectively, as in those made to companies or societies, all the lands

included in the general approved plan as those which can receive irrigation, are held subject, even when their owners refuse it, to the payment of the fee or rate which may be established, as soon as the concession may be accepted by the majority of the proprietors interested, computed in the manner which is determined in number 3 of article 189. The companies in this case, shall have the right to acquire the lands whose owners refuse the payment of the fee, for their value when dry, subject to the prescriptions of the law and the regulations for enforced expropriation. If the company does not take the lands, then the proprietor who does not irrigate them shall be exempt from the payment of the fee.

ART. 198. Besides the rate which the irrigators have to pay to the societies or companies who undertake the construction of canals and reservoirs for irrigation, for the payment of the interest and principal of the capital invested in the works, there can be granted, by way of subsidy, during a period of five or ten years, the value of the increase of the tax, which has to be imposed on the owners of the lands, after the first ten years in which they may be irrigated. The same subsidy can be granted to the associations of proprietors, who shall collectively carry to completion the construction of canals and reservoirs for the irrigation of their own lands. The concessions which may have this subsidy, can only be issued by means of a law, the others being conceded by virtue of a royal decree, subject to what is arranged in article 147 of this law, and in accordance with that which the general law of public works provides.

ART. 199. The lands which may have to be irrigated in conformity with the prescriptions of the present law, are declared included in the exemption from the tax, upon the first change of ownership.

ART. 200. Works necessary for the employment of public waters in irrigation, may be declared of public utility, for the operation of the law of enforced expropriation, provided that the volume of the water exceeds 200 litres per second.

ART. 201. If provincial *diputacions*, syndicates, municipalities, national or foreign companies, or private persons, go to the minister of public works, petitioning that a scheme for a canal or reservoir for irrigation shall be examined by the state, he shall order it at their instance, when it will not hinder the public service, and provided that the petitioners shall agree to pay all the expenses of said examinations in conformity with that which is determined in the regulation of this law.

ART. 202. The owners, societies, corporations, or syndicates of canals or ditches already existing by virtue of authorization, concession, decree, or other special title, who should not have finished their works at the publication of the present law, have the right to receive the benefits of the same. For executing them a law will be necessary, whose scheme the minister of public works shall

present to the cortes, and after having examined the measure, if the benefits designed are to result in public utility it shall be passed.

ART. 203. For the useful employment of the public waters left over from irrigations, and proceeding from filtrations or leakages, as well as those from drainage, where no special rule should have been established, that which is arranged in articles 5 to 11 and those following, on the useful employment of surplus waters of private property, shall be observed.

ART. 204. For the general interest in the better employment of waters, the minister of public works shall direct what shall be done for the examination of the existing rivers, with the view of providing that no irrigator shall waste the water of his allotment, which might be of use to others in need of it, and with that of preventing the waters of freshets from flowing unproductively and even injuriously away to the sea, when other districts are longing and begging for irrigation and regular applications of the water, without injuring acquired rights.

Section Fifth—Of the Employment of Public Waters for Canals of Navigation.

ART. 205. The authorization to a society or private company to canalize a river with the object of making it navigable, or to construct a canal of navigation, will be granted always by a law, in which it shall be determined whether the work is to be subsidized with funds of the state, and which will establish the other conditions of the concession.

ART. 206. The duration of these concessions shall not exceed 99 years, after which the state shall enter into a free and complete enjoyment of the works, and of the materials for operation, according to the conditions established in the concessions; excepting, as a general rule, the waterfalls utilized and the buildings constructed for industrial establishments, which shall remain the property of and at the free disposal of the grantees.

ART. 207. The first ten years of the working of a canal having passed, and successively every ten years, a revision of the tariffs shall be made.

ART. 208. The companies can at any time reduce the rates of the tariffs, giving information of it to the government. In this case, as in those of the former article, the alterations which will have to be made shall be announced to the public at least three months beforehand.

ART. 209. The grantees shall be obliged to preserve the works in good condition, as also the service of operation, if it should be in their charge. When, by reason of non-fulfillment of this duty, navigation may be rendered impossible, the government shall fix a time for the repair of the works or renewal of the materials; and

this time having passed without the object having been attained, the government will declare the concession forfeited and announce a new sale of it, which shall take place under the terms prescribed for the canals of irrigations in article 196.

Section Sixth—Of the Occupation of the Public Waters for Ferries, Bridges, and Industrial Establishments.

ART. 210. On rivers neither navigable nor floatable, owners of both margins can establish ferryboats, having first obtained the authorization of the *alcalde* or bridges of wood, having obtained the authorization of the governor of the province, who shall fix their location, the tariffs, and other necessary conditions, in order that their construction and service may offer the required security to passengers.

ART. 211. Whoever wishes to establish on rivers floatable only, ferryboats or bridges to place in public communication country roads, or ferryboats on neighborhood roads which are without bridges, shall solicit the authorization from the governor of the province, designating the points at which he intends to locate them, their dimensions and system, and accompanied by the rates of passage and service. The governor shall grant the authorization in the terms prescribed in the former article, taking care, however, that it does not hinder the service of flotation. The concession for bridges which connect the ends of neighborhood roads, on rivers floatable only, shall be made, in subjection to the law for high-roads, of the fourth of May, 1877.

ART. 212. In respect to the navigable rivers, the minister of public works alone is empowered to grant authorization for ferryboats or floating bridges for the public use. On granting the concession, the tariffs for passage, and other conditions required for the service of navigation and flotation, as well as for the security of passengers, shall be fixed.

ART. 213. The concessions to which the former articles refer, give the right to indemnification for the value of the works, only when the government is obliged to take them for the benefit of the general interest.

ART. 214. Said concessions do not prevent the minister of public works from ordering the establishment of ferryboats and floating or permanent bridges, provided that he considers them advantageous for the public service.

When this new means of crossing stops or materially interferes with the use of a boat or bridge of private ownership, the owner shall be indemnified for the value of the work, if his property is not founded on titles of civil law, in which case the law of enforced expropriation on account of public utility shall apply to it.

ART. 215. On the rivers neither navigable nor floatable, the owner of both margins may freely establish any sort of machine,

engine, or industrial establishment, which will not cause the diversion of the waters from their natural course. Being the owner of only one margin, he must not build past the middle of the channel. In either case he must erect his establishment without stopping the free flow of the waters, nor cause any injury to the bordering properties, irrigations, or industrial establishments, including that of fishing.

ART. 216. The authorization to establish on the navigable or floatable rivers, any apparatus or floating machinery, whether or not they have to transmit the movement to others fixed on the land, may be granted by the governor of the province, after having investigated the case, and hearing the owners of both margins, and those of the industrial establishments immediately below, and, moreover, the following facts being proven:

First—The applicant to be the owner of the margin where the boats are to be moored, or to have obtained permission from whoever may be the owner.

Second—That no obstacle be offered to navigation or flotation.

ART. 217. In the concessions of which the former article speaks, it shall always be understood:

First—That if alteration of the currents occasioned by the floating establishments cause damage to the riparian owners, the repairs shall be at the cost of the grantee.

Second—If from any cause relative to the river, or to the navigation or flotation, the removal of the floating establishment becomes necessary, the concession can be annulled, without the grantee having a right to any indemnification. But in the proceeding which, in this case, is carried on, the consulting council for roads, canals, and ports must be consulted, for the account to which this paragraph refers.

Third—If for any other cause of public utility it should be necessary to destroy any construction of this class, its owners shall be indemnified, according to the law of expropriation, provided that it may have been legitimately established, and should have been in constant use. It shall be understood that such works are not in constant use when two consecutive years should have passed without employing them.

ART. 218. As well in navigable or floatable rivers, as in those which may not be, the power belongs to the governor of the province to concede authorizations for the establishment of mills or other industrial manufactories in buildings situated near the banks, to which the necessary water is conducted by channels, and which afterwards is reunited to the current of the river. In no case shall this authorization be granted to the injury of the navigation or flotation of the rivers and existing industrial establishments. In order to obtain the authorization to which this article refers, it is indispensably requisite for whosoever solicits it to be the owner of the land where he intends to construct the build-

ing for the manufactory, or to be authorized by whoever may be the owner of it.

ART. 219. When an industrial establishment communicates to the waters substances and properties injurious to health or to vegetation, the governor of the province shall direct that a professional examination be made, and if the injury be clearly proved, he shall order that the industrial works be suspended until their owners adopt a fitting remedy. The fees and charges for the examination shall be paid by him who made the complaint, if it proves groundless; and, otherwise, by the owner of the establishment. When the owner or owners, at the expiration of six months, should not have adopted the proper remedy, it shall be understood that they refuse to continue in the carrying on of their industry.

ART. 220. The concessions for employments of public waters for industrial establishments, shall be agreed to in perpetuity and on condition that if at any time the waters acquire properties injurious to health or vegetation, on account of the industry for which they were granted, the forfeiture of the concession shall be declared, without the right to any indemnification.

ART. 221. Those who employ the water as a motive power for machinery or industrial establishments, situated within the rivers or on their banks or margins, shall be exempt from the payment of taxes during the first ten years.

Section Seventh—Of the Occupation of Public Waters for Fish-Ponds and Hatcheries.

ART. 222. The governors of the provinces can grant rights to occupy public waters, in order to form lakes, ponds, or tanks intended for fish-ponds or for breeding fish, provided that they do not cause injury to health or to other employments, with rights previously acquired lower down.

ART. 223. For the industries spoken of in the former article, the petitioner shall present the complete project of the works, and the title which proves him to be the owner of the land where they are to be constructed, or that he has obtained the consent of him who is the owner. The governor of the province shall conduct the proper formalities for the purpose.

ART. 224. The grantees of public waters for irrigation, navigation, or industrial establishments, after due formalities, can make in their canals, or on contiguous lands which they might have acquired, ponds or tanks for breeding fish.

ART. 225. The authorizations for breeding places for fish are granted in perpetuity.

TITLE V.

CHAPTER XII—*Of the Police of Waters.*

ART. 226. The police of the public waters and their natural channels, banks, and zones of servitude, shall be in charge of the administration, and the minister of public works shall direct it, dictating the necessary regulations for good management in the use and employment of the waters.

ART. 227. In relation to the waters of private ownership, the administration shall exercise over them the necessary vigilance, in order that they shall not injuriously affect the public health nor the security of persons or properties.

CHAPTER XIII—*Of Associations of Irrigators, and of Syndicates, and Juries of Irrigations.*

Section First—Of the Associating together of Irrigators, and of their Syndicates.

ART. 228. In the joint employments of public waters for irrigation, a community of irrigators shall necessarily be formed, subject to the ruling of their ordinances:

First—When the number of them amounts to 20, and the number of irrigable hectares is not less than 200 (494 acres).

Second—When in the opinion of the governor of the province the local interests of agriculture require it.

Outside of these cases, the formation of the community requires the choice of the majority of those irrigating.

ART. 229. Notwithstanding that which is arranged in the former article, the irrigators whose properties take the water before or after those of the community, cannot be compelled to form part of the community, and can separate from it, and in their turn can establish a new one, and form for themselves alone a district or guild without necessity of continuance.

ART. 230. Every community shall have a syndicate elected by it, and charged with the execution of the ordinances and resolutions of the said community.

ART. 231. Irrigating communities shall frame their ordinances for irrigation according to the basis established in the law, submitting them for the approbation of the government, which cannot refuse them, nor introduce variations, without hearing the council of state concerning it.

The public waters devoted to joint utilizations, which have hitherto had a special system embodied in their ordinances, shall continue subject to the same as long as a majority of those interested do not wish to modify it, subject to that which is prescribed

in the present law, without prejudice to the accomplishment of that which is arranged in article 190.

ART. 232. The number of individuals of the syndicate, and their election by the community of irrigators, shall be determined in their ordinances, the extent of the irrigations being considered, and according to the ditches which require special care, and the towns interested in each community.

In said ordinances the qualifications of the electors and those eligible for election shall be fixed; and the time and form of the election shall be established, as well as the duration of the service, which shall always be gratuitous, and which they cannot refuse except in case of reëlection.

ART. 233. All the expenses incurred by a community, for the construction of dams and ditches, or for their repair, maintenance, or cleaning, shall be defrayed by the irrigators in equitable proportion. The new irrigators who should not have contributed to the cost of the dams or ditches constructed by a community, shall pay, for the benefit of this, an additional tax arranged on equitable terms.

When one or more irrigators of a community shall have obtained the competent permission to make, on their own account, works on the dam or ditches, in order to increase the amount of the waters, the other irrigators having refused to contribute, the latter shall have no right to a greater quantity of water than that which they formerly enjoyed. The increase obtained shall be at the free disposal of those who have paid for the works, and in consequence they shall regulate the turns for irrigation, by which their respective rights may be protected. If any person should attempt to conduct waters to any other locality, employing the dams or ditches of a community of irrigators, he shall arrange and adjust with it, in the same manner as he would with a private person.

ART. 234. In the irrigated districts existing at present, and governed by rules already written and generally practiced by a community of irrigators, no one shall be injured nor reduced in the enjoyment of his portion and use of the water, by the introduction of any novelty in the quantity, application, or distribution of the waters in the district irrigable. But, neither shall any one have a right to the increase, if the supply is increased by the efforts of the said irrigators or any of them, unless that he should have contributed proportionally to pay the expenses.

ART. 235. In order to usefully employ in the movement of fixed machinery, the motive power of the waters which run through a canal or ditch owned by a community of irrigators, their permission will be necessary. For this purpose they shall assemble in general council, and the majority of those present shall decide it, computing the votes by the property which each one represents. On its refusal, appeal can be made to the governor of the province who, having heard the irrigators, chief engineer of roads, canals,

and ports of the province, the provincial board of agriculture, industry, and commerce, and the permanent committee of the provincial *diputacion*, can concede the privilege, provided that it does not cause injury to the irrigation nor to other industries, unless that the community of irrigators wish to employ for themselves the same motive power, in which case they shall have the preference, being required to make a beginning of the works within the term of one year.

ART. 236. In the syndicates there shall be necessarily one representative of the lands, which on account of their situation, or by the order established, may be the last to receive irrigation; and when the communities are composed of several centers of population, either agricultural or manufacturing, directly concerned in the good management of their waters, each shall have in the syndicate its corresponding representation, proportionate to the right which the use and employment of the same waters confers on them. In the same manner, when the water-right may have been conceded to a private company, the grantee shall be naturally a member of the syndicate.

ART. 237. The community shall frame the regulation for the syndicate. The functions of the syndicate shall be:

First—To watch the interests of the community, to promote its development, and to defend its rights.

Second—To dictate suitable provisions for the better distribution of the waters, respecting the acquired rights and the local customs.

Third—To appoint and discharge their employés in the manner which the regulations establish.

Fourth—To make the estimates and assessments and to examine the accounts, submitting each of them for the approbation of the general assembly of the community.

Fifth—To propose to the assemblies the ordinances and regulations, or any alterations which they should consider useful to introduce in those already existing.

Sixth—To establish strict turns of water, conciliating the interests of the different cultivations among the irrigators, and taking care that in the years of scarcity it shall be distributed in the manner most advantageous to the lands interested.

Seventh—All of those which the ordinances of the community or the special regulations of the said syndicate allow to them.

The resolutions which the syndicates adopt for irrigation by virtue of their ordinances, when they act as commissioners of the administration, shall be discussed before the municipal councils or the governors of the provinces, according to the cases.

ART. 238. Each syndicate shall elect from among its voters a president and vice-president, with powers which the ordinances and regulations establish.

ART. 239. The communities of irrigators shall hold regular general assemblies, at the times designated by the ordinances of irrigation, and extraordinary assemblies in the cases which the same ordinances determine. These ordinances shall fix the conditions required for taking part in the deliberations, and the manner of counting the votes, in proportion to the property which those interested represent.

ART. 240. The general assemblies at which all the irrigators of the community, and the manufacturers interested, have the right of participating, shall decide on the disputed subjects of common interest, which the syndicates and any of those present may submit for their decision.

ART. 241. When, on the course of a river, several communities and syndicates exist, they can form, for their mutual convenience, one or more central or common syndicates, for the defense of the rights, and the maintenance and protection of the interests of all. It shall be composed of representatives of the communities interested. It can also be formed by order of the minister of public works and by the authority of the governor of the province, provided that the interests of agriculture require it. The number of the representatives which may be nominated shall be proportioned to the extent of the irrigable land embraced within the respective boundaries.

Section Second—Of Juries of Irrigation.

ART. 242. Beside the syndicate, there shall be in every community of irrigators one or more juries, according as the extent of the irrigations require it.

ART. 243. Each jury shall be composed of a president, who, being appointed by it, shall be a member of the syndicate; and of a number of jurors, either proprietors or their representatives, which the regulation of the syndicate may fix, all named by the community.

ART. 244. It is the duty of the jury:

First—To become acquainted with the questions of fact, which are raised during irrigation, and decide between those interested in it.

Second—To impose, for the violations of the ordinances of irrigation, the penalties for which there may be occasion, according to the said ordinances.

ART. 245. The proceedings of the tribunal shall be public and oral, in the manner which the regulation determines. Its decisions, which shall be executory, shall be recorded in a book, with the declaration of the facts and the authority of the ordinances on which they are founded.

ART. 246. The penalties which the ordinances of irrigation establish for infringements or abuses in the employment of their

waters, obstruction of the canals or of their sluices, and other irregularities, shall be pecuniary, and shall be awarded to the persons injured and to the funds of the community, in the manner and proportion which the same ordinances establish. If the case is criminal, it can be denounced by the irrigator or industrial user injured, or by the syndicate.

ART. 247. Where ancient tribunals of irrigation exist, they shall continue with their present organization as long as the respective communities do not determine to propose their reformation to the minister of public works.

CHAPTER XIV—*Of the Attributes of the Administration.*

ART. 248. It is the duty of the minister of public works, as being charged with the execution and application of the present law:

First—To dictate the regulations and instructions necessary for the purpose.

Second—To grant by himself, or by means of the authorities who are subordinated to him, the water employment privileges which are the subject of the present law, provided that on account of the power expressed in it, its concession does not belong to other authorities, or to the legislative power.

Third—To determine finally all the questions raised by the application of the present law, when the decisions of his deputies do not cause settlement, and excepting the appeals which have been occasioned under the same.

Fourth—To determine and execute the limits, surveying, and marking out how much belongs to the public domain, in virtue of the regulations of this law, without prejudice to the competency of the tribunals, relating to the questions of property and possession.

ART. 249. Projects, the approbation of which are authorized by the governors, and concessions which they have the power to grant, shall be decided in the term of six months. If it cannot be done in this manner the petitioners can have recourse to the minister of public works, who shall dictate the determination which may have to be issued before the expiration of four months from presenting the remonstrance.

ART. 250. For the granting of the water employment privileges, which are the subject of this law, besides that which the regulation prescribes in each case, it is indispensably necessary to have a hearing of the person, if he shall be known, whose rights the concession may affect, or to give publicity to the scheme and the resolutions which the administration dictates concerning it, when he shall be unknown, or when the concession affects the collective interests which do not constitute legal personality or need legal representation.

ART. 251. The decisions dictated by the municipal administration on the subject of waters, if there is no objection to them before the governor within the period of fifteen days, will be final.

Those which the governors dictate will produce the same effect, if there is no recourse against them by administrative procedure, before the ministry of public works, or by way of administrative court procedure when it is carried before the provincial commissioners as administration courts. In either case the appeal must be interposed within the term of one month, counting from the date of the administrative notification, which shall be in proper form.

The resolutions of the central administration shall be opposed by way of the administrative courts, in the cases which the present law determines, provided that the appeal is interposed in the term of three months, counting from the administrative notification, or the publication in the Gazette if the residence of those interested should be unknown, to whom, otherwise, the result shall be made known by the proper central director, or by the governor of the province.

ART. 252. Against the measures dictated by the administration within the scope of its power in the matter of waters, interdicts by the tribunals of justice shall not be admitted. These can only be recognized at the request of the party, when in the cases of enforced expropriation, prescribed by this law, the corresponding indemnification should not have preceded the removal of the owner.

CHAPTER XV—*Of the Jurisdiction of the Courts in the Matter of Waters.*

ART. 253. It comes within the administrative-court jurisdiction, to take cognizance of the appeals against the decisions dictated by the administration in the matter of waters in the following cases:

First—When the forfeiture is declared of a concession made to private persons or companies in the terms prescribed in the general law of public works.

Second—When, on account of it, acquired rights are injured by orders emanating from the said administration.

Third—When an enforced servitude, or some restriction or burden, is imposed on private property, in the cases prescribed by this law.

Fourth—In the questions on compensations which are raised for damages and injuries, in consequence of the restrictions and burdens of which the former paragraph treats.

ART. 254. It is the duty of the courts which exercise civil jurisdiction, to investigate questions, relative:

First—To the dominion of the public waters and to the ownership of the private waters, and of their possession.

Second—To the dominion of the shores, beds, or channels of the rivers, and to the ownership and possession of the river banks, without prejudice to the competency of the administration, to mark off, survey, and lay down boundaries of that which appertains to the public domain.

Third—To the servitudes of waters and of passage through the margins, founded on titles of civil right.

Fourth—To the right of fishing.

ART. 255. It also is the duty of the tribunals of justice, to investigate questions raised between private parties on account of priority of right to the useful employment of water according to the present law:

First—Of the rain waters.

Second—Of the other waters out of their natural channels, when the priority is founded on titles of civil rights.

ART. 256. It equally is the duty of the tribunals of justice, to investigate the questions relative to damages and injuries occasioned to third parties, in their rights of private property whose alienation may not be compulsory:

First—By the opening of ordinary wells.

Second—By the opening of artesian wells, and by the execution of subterranean works.

Third—By every class of useful employment of waters on account of private persons.

GENERAL PROVISIONS.

ART. 257. All of that which is arranged in this law is without prejudice to rights legitimately acquired previous to its publication, as well as to those of private ownership, which the proprietors of waters, of canals, and of fountains or springs have, by virtue of which they employ, sell, or exchange them as private property.

ART. 258. All the laws, decrees, orders, and other regulations, in relation to the matter comprehended in the present law, which have been dictated prior to its promulgation, and which might be in contradiction to it, are repealed.

APPENDIX III—A.

Model Ordinance for a Community or Association of Irrigators.

*ISSUED AS AN ADMINISTRATIVE REGULATION.**

GENERAL GOVERNMENT OF SPAIN.

June 25, 1884.

CHAPTER I.—*Composition of the Community.*

ARTICLE 1. The proprietors, irrigators, and other users who have the right to the employment of the waters of [here name the canal, ditch, spring, or other direct source of supply], are hereby constituted a *community of irrigators*, and named [here insert name adopted], in virtue of the provisions of article 228 of the law of waters of June 13, 1879.

ART. 2. [Describes fully the lands and buildings, and in general terms the canals and other works which are the property of the community or become so by virtue of the organization.]

ART. 3. [Describes fully and in detail the water rights which are the property of the community or which become so under the organization; stating points of diversion, volumes and sources of water, history and source of title, etc.]

ART. 4. [Describes fully and in detail the lands which are embraced in the community, and which are entitled to waters for irrigation under the regulations of the community, and also describes the mills or other industrial establishments which are embraced in the organization, and names the flow of water to which they are each entitled, and the agreed rotation in delivery, if any.]

ART. 5. The principal object in forming the association being to avoid quarrelings and litigations between the different users of water from the same natural sources and artificial works, all those embraced in the organization have voluntarily submitted themselves to all that is fixed in these ordinances and regulations, and are obligated to its faithful fulfillment, expressly renouncing any other jurisdiction or law; *always provided*, that their rights and the established uses and customs of the locality are respected according to the second paragraph of article 237 of the law of waters.

ART. 6. No irrigator who is a member of the community can withdraw from it without absolutely renouncing his right to utilize the waters, provided his case be not of that class spoken of as an exception to this rule in article 229 of the law. Should it be of that class, at his instance there shall be an examina-

* This is a liberal translation and abridgment of the Ordinance and explanations as given by *Bentaból y Ureta*, p. 155, *et seq.*

tion made under the direction of the governor of the province, who, after consulting his technical and administrative advisers, shall decide the question of withdrawal, there being, however, an appeal to the minister of public works, reserved in accordance with the law.

No irrigator or farmer can become a member of the community after its formation, except by consent of a majority vote of its members in general assembly; *provided*, however, that an appeal to the governor may be taken, and so on, as the law directs.

ART. 7. The community is hereby obligated to pay every expense of construction, repair, and preservation of all its works, structures, and properties, and for the administration, and service to irrigators and manufactories, and for business management and defense of the common rights, subject to the provisions of these ordinances and regulations.

ART. 8. The rights and obligations of the individual irrigators and other users who consume water, shall be computed in proportion to its employment or the quantity to which they have claim, or the quantity of water which they consume, or to the extent of the land which they irrigate or have right to irrigate, as well as to the amounts which they contribute to the outlay of the community.

ART. 9. The rights and obligations of the individual mills and manufactories which utilize the motive power of the water shall be determined at once for all time, as it is agreed to between the irrigators and the owners of these establishments, without prejudice to the modifications which may afterwards be determined by mutual consent.

ART. 10. The member of the community who does not make payment of the sums charged to him, according to the terms of these ordinances and the regulations thereunder, shall pay an additional charge of ten per cent per month on his delinquent payments. When payments and additional charges are delinquent for three consecutive months, the use of water shall be prohibited, and the rights which are due the community shall be enforced against the delinquent, taking into account, at the same time, the expenses and injuries which may have been caused by him.

ART. 11. The community, as represented and united in general assembly, assumes all the power which is inherent in the same. For the details of government and management a syndicate and court of irrigation are established as by the law directed.

ART. 12. The community shall have a president and secretary, elected in general assembly in like manner to the members of the syndicate and court or jury of irrigation.

ART. 13. [Defines the qualifications—standing, interest in community, personal attributes, etc.—necessary for eligibility as president.]

ART. 14. [Fixes the term of the president.]

ART. 15. [Declares that the duty of the president shall be gratuitous and that he cannot refuse the office except in case of immediate reëlection, etc.]

ART. 16. [Defines the duty of the president—making him, in general terms, in addition to duties as presiding officer, the official representative of the community in outside matters, and particularly with the governmental authorities, and also charging him with a general supervision of the syndicate and of the irrigation court or jury.]

ART. 17. [Defines the qualifications, etc., necessary to be eligible as secretary.]

ART. 18. The length of the term of office of the secretary shall not be fixed, but shall be at the will of the general assembly and upon the suggestion of the president.

ART. 19. [Concerns the salary of the secretary.]

ART. 20. [Defines the duties of the secretary; making him generally the recorder and bookkeeper of the association.]

CHAPTER II.—*Of the Works.*

ART. 21. There shall immediately be prepared, and thereafter kept posted, a schedule or inventory, in which shall be named and described, as particularly as possible, all of the works, structures, and accessory arrangements which are the property of the community, at the time of its forming, and thenceforward; commencing with the dam or dams for taking the waters, their principal dimensions, class of construction, nature, dimensions, and descriptions of openings, position and relative elevation of bench marks for reference as to legal height; then the principal canal, or canals if more than one, ditches derived from these, and their main branches, with their respective alignments and position, structures, characters, sectional and other dimensions at various places, grade slopes, capacities, etc.; and, finally, the buildings and other works of administration.

ART. 22. Whenever it is proposed to construct new works, or to extend or enlarge those already built, the proposition shall be considered in general convention of the community, and there determined upon, after having secured a governmental authorization if necessary.

ART. 23. [In this article should be named the works which within the community district, remain the property of private individuals, but which form part of the system of the community works, such as distributing ditches, certain structures, gates, etc., and stating clearly which of such works are to be maintained at the expense of the community and which at the expense of their owners. In general, the works which belong to individuals, and are subject to their management or handling, should be maintained at their cost and responsibility.]

ART. 24. The syndicate may order studies to be made of projects of works for the better utilization of the waters possessed, or the increase of the supply; but it cannot carry forward such works without the previous sanction of the community in general assembly; nor in this case can any assessment or tax be collected for such works executed without authority. Only in cases of urgency, when circumstances and time will not permit of the convening and action of a general assembly, may the syndicate inaugurate works, and they shall then call a general assembly as soon as possible to give an account of their extra proceedings. The syndicate shall have the final approval of plans of works of repairs and conservation, so long as the total annual cost is kept within the estimated total sums approved by the community in general convention.

ART. 25. [In this article shall be determined the number and times of cleaning or clearing of works to be effected through the year, taking into account the necessities of the cultivations, times of water supply, etc. And the measure of authority of the syndicate, to order extraordinary work of this kind, should be stated.]

ART. 26. No one shall do work on, or add to, or change the dams, canals, main and branch ditches, or other works of the community, without the previous express authorization from the syndicate.

ART. 27. The owners of lands bordering the canals or ditches of the community must not make works of any class on their edges or margins, not even on pretext of defending their property, which the syndicate in any way opposes. Should such works be necessary, the syndicate will on application order them done, or will under conditions permit the owners to do them under its direc-

tion. Neither can the owners make any plantation or cultivation on the margins at a less distance from the edge of the work than that prescribed in the ordinances and regulations of rural police. The community, however, may protect the margins of its channels as may be advantageous, and do all it may require upon the margins except the planting of trees within the legally prescribed limit.

CHAPTER III.—*Of the Use of Waters.*

ART. 28. Each member of the community has a right to the use of water for irrigation, power, or industrial purposes, as the case may be, to the extent proportional to his interest in the community as determined under a former article.

ART. 29. [In this article shall be named the order established for the use of the waters in irrigation, for power, and for industrial purposes, and the order established for use from the different main works or branches, if any, and the order, if established, for its use by the different members of the community, as may be agreed to in general convention, and respecting always the established rights of individuals, and the power of the syndicate, under article 237 of the law, to establish regulations for the better utilization of waters.]

ART. 30. Unless the community in general assembly shall determine otherwise, the turns or rotations of water distribution which are found established for irrigations, at the time of organization, shall never be changed to the prejudice of any one.

ART. 31. The distribution of the waters shall be effected under the direction of the syndicate, by the *acequiero* charged with such service, and in whose possession are lodged the proper keys. No irrigator can himself take water except at the time of his established and recognized turn.

ART. 32. No irrigator can, depending on the class of cultivation which he adopts, claim a greater quantity of water, or his use of it for a longer time, than that which, in the one or the other proportion, corresponds to his measure of right.

ART. 33. If there should be a scarcity of water, or a less quantity available than that which is due the community or to the irrigators, that disposable shall be distributed by the syndicate equitably and in proportion to the several rights of the irrigators.

CHAPTER IV.—*Of the Lands and Manufactories.*

ART. 34. For the greater order and accuracy in the utilization of the waters and the assessment of community taxes, as well as to insure proper respect for all individual rights, there shall always be posted, according to position in the district, a general register showing: (1) In the matter of lands: the name of owner and contents in *hectares* of each property, its boundaries and limitations, right to water, in units of volume, turns, or times, and the proportionate part which it has to bear of the total expenses of the community according to that which has been already prescribed in articles 7, 8, and 23 of these ordinances; and (2) in the matter of mills and industrial establishments: the name by which each is known, its situation with respect to the ditch or canal from which it takes water, the quantity of water to which it has a right, expressed by volume and time, if determined, or its proportionate part of the whole flow, if the volume is not known, with the time for its use and the names of its owners, and also the actual amount or proportionate part of the total expenses which the work has to contribute to the community, and the vote or votes which are assigned for the representation of the property in the general convention.

(In case, as happens in many old communities, the water-rights are in whole or in part held separately from the land, and hence, can be utilized on different properties within the irrigable district, there shall be, also, ordered, in this article, the formation of another register for the community members owning water-rights, in which shall appear a record of the part or proportion which belongs to each, expressed as in the former case described, together with the amount or proportion of the whole which each will have to contribute to the expenses of the community and the number of votes to which each is entitled in the general assembly.)

ART. 35. [Provides for another register arranged alphabetically by names of members, "to facilitate voting and the levy of assessments," etc.]

ART. 36. For the purposes expressed in article 21 there shall also be prepared one or more complete plats or plans of the district, showing all of the irrigable lands, their waters and works, on a scale or scales sufficiently large to represent with clearness and precision the limits of the irrigable district embraced by the community, and the limits of each piece of property, the point or points for its taking water, the channels for its delivery, and the locality and class of their structures, and all other buildings owned by the community; as also the locality of all mills and industrial establishments, with their channels, openings, and drainage ways.

CHAPTER V.—*Of Offenses, Indemnities, and Penalties.*

ART. 37. Any member of the community who—even without any intention of doing harm, and only from ignorance of the consequences, or by neglecting the fulfillment of duty imposed by the ordinances—commits any of the following named acts, is guilty of an offense against the ordinances, which shall be punished on the decision of the jury of irrigation of the community, namely: *By damages to works*—(1) to permit any animal in one's possession to graze in the channels, or on the banks or margins; (2) to make a watering place by a channel, although no obstruction is caused, nor damage occasioned; (3) to obstruct or pollute a channel or its margins, or impair any channel or structure: *By use of waters*—(1) to avoid or neglect taking due care of one's own gates, modules, or partitioners as adjudged by the syndicate; (2) to neglect placing the accustomed signal or sign for the *acequiero* when one does not wish to irrigate at night; (3) to allow water to pass to the drains and waste without utilization without giving due notice to the syndicate and seeking proper remedy; (4) to take water even at one's own turn without observing the formalities and rules herein laid down; (5) to take more water than is due, or that which does not belong to the person taking, or cause it to be wasted, either by backing up in the channel and overflowing, by keeping a gate open too long, or by disarranging a gate, module, or partitioner; (6) to take water from a community ditch or its main branches, by other means than the established gates of distribution; (7) to take directly, by force or other means, from the said canal or its branches or distributaries, any water for irrigation, without due authorization from the community; (8) to obstruct the current in any way in order to increase a stream of distribution; (9) to neglect closing the openings at the finish of one's irrigation turn, thus causing waste or loss of water; (10) to water cattle or horses at points other than those designated for the purpose on the ditches; (11) to wash clothes in, establish a fish pond, or otherwise employ waters of the community without authority; (12) to abusively drive the water into channels, in order to augment the power of a fall for motor purposes; (13) to occasion injury to community or individual rights or property by any infrac-

tion of these ordinances or by committing any abuse or excess, whether intentional or not.

ART. 38. Only in cases of fire can waters of the community be taken without committing an offense, either by members or strangers to the community.

ART. 39. Irrigators or other community members offending, by infraction of these ordinances, shall, on information, be judged, and, if proper, be punished on the judgment of the jury of irrigation of the community, and shall pay, if imposed by the jury, indemnity for damages and injuries caused to the community, or any member thereof, and also a fine by way of punishment, but which in no case may exceed the limit contained in the penal code for similar offenses. (The limits of fines should be attached to each specific offense contained in the foregoing article 37, for the guidance of the jury.)

ART. 40. When offenses in water utilization cause injury, although insensible, to the property of the community or a member, but which results in loss of water or increased expense of maintenance, the jury shall estimate the extent of injury and impose the fine, and the community shall receive the amount paid.

ART. 41. The jury shall, in its discretion, judge of and inflict punishment for acts of offense not named in this ordinance, by comparison with those which are herein mentioned.

ART. 42. If offenses charged are not those herein named, and are criminal before the laws, or are committed by persons not members of the community, the syndicate shall lodge information with the proper authorities, as the law provides.

CHAPTER VI.—*Of the General Convention or Assembly.*

ART. 43. The aggregation of all members of the community shall constitute its general assembly, holding supreme power in the district.

ART. 44. Twice a year, and following a call from the president published for fifteen days, the general assembly shall meet. [Here follows more specific instructions as to times, etc., of holding the conventions, according to the necessities of agriculture and convenience of irrigators.]

ART. 45. [Contains instructions as to character of publications to be made, and names classes of business of which notice must be given in the publication, in order to be taken up at the meeting. Amendments to these ordinances being of the chief class.]

ART. 46. [Contains provisions concerning the place and times of sessions, presiding officers and secretaries.]

ART. 47. All members of the community have right to take part in the proceedings of the assembly, and have right to vote on questions put, who possess (here shall be stated the least extent or area of irrigable land, or volume of water, in litres per second, or flow in units of time, which confers on the owner a right to vote), and also all holders of water-power privileges.

ART. 48. The votes to which members who are irrigating proprietors or water-right owners are entitled, shall be determined as directed in article 239 of the law of waters, in proportion to the property which each represents. To fulfill the legal rule, one vote shall be counted for [Here explain system adopted. There should be a least and a greatest limit of interest corresponding to the first vote of a member, and then he should have an additional vote for every duplication of these amounts.] Those who own interests in parcels too small to entitle them to a vote, may unite their interests and fix on one of their number to cast the corresponding ballots, but evidence of this must be presented in writing.

ART. 49. Members of the community may be represented in the assembly by other members, upon a written authorization. [Other provisions at great length about representation.]

ART. 50. The general convention shall have power (1) To elect the president, members of the syndicate, and those of the jury of irrigation, with their substitutes, and member or members of the central syndicate, if any; (2) to examine, debate, and sanction or reject all plans and estimates, (3) all accounts and reports; (4) to authorize the levy of ordinary and extraordinary taxes or assessments.

ART. 51. The general assembly shall specially consider (1) Propositions and estimates for new works, (2) extraordinary taxes, (3) acquisition of additional waters, (4) complaints lodged against the syndicate, (5) matters brought to its attention by the syndicate, and (6) matters relating to changes in utilization of the waters.

ART. 52. [Specifies subjects proper to be considered at autumn or winter meeting of assembly.]

ART. 53. [The same, for spring or summer meeting.]

ART. 54. A majority vote by members present or properly represented shall determine questions put. The voting may be public or secret.

ART. 55. [Contains matters of detail with respect to voting at first assembly and subsequent meetings.]

ART. 56. [Subjects which can not be voted on without special notice.]

ART. 57. Every member may present subjects for discussion, whether notice has been given or not, in order that they may be on the list for the next meeting of the assembly.

CHAPTER VII.—*Of the Syndicate.*

ART. 58. The syndicate charged specially with executing these ordinances and the decisions of the community, shall be composed of —— members, elected directly by the community in general assembly. One member shall represent exactly the small group of properties, which, by reason of situation or order established, must last receive the waters. When the community is composed of several companies or associations, of either irrigators or manufacturers, or both, each shall have its representation in the syndicate corresponding to the extent of its interest. [The above is an abridgment of a long article intended to insure to each sub-district or well defined local or class interest in a community its due and proportional representation in the syndicate. The article closes with a note to the effect that the number of members of the syndicate must be adjusted from time to time, as may be necessary, to the varying interests to be represented.]

ART. 59. [Provides that when the community uses waters delivered by a company or individual under a government concession, the grantee shall be a member of the syndicate.]

ART. 60. [Contains detailed instructions for balloting in the general convention for members of the syndicate, for canvassing and proclaiming the result, and issuing certificates of election.]

ART. 61. [Concerns the taking of office by member of the syndicate newly elected.]

ART. 62. The syndicate shall elect a president and vice-president from amongst its members, etc.

ART. 63. [Specifies qualifications to be eligible as member of the syndicate—one being a qualified voter of the community, have an interest entitling the holder to —— number of votes.]

ART. 64. The member of the syndicate who, during his term, loses any of the foregoing qualifications, shall immediately forfeit his office, and his place shall be taken by the substitute from his quarter of the district.

ART. 65. The term of holding as a member of the syndicate shall be four years; half of its members being elected each two years. [Enters at length into details as to keeping certain interests and localities properly represented.]

ART. 66. Members of the syndicate shall serve without compensation; and cannot refuse office unless immediately reëlected, or by reason of change of residence, or being upwards of 60 years of age.

ART. 67. When there is more than one community of irrigators to utilize waters from any one source of supply, and it is desired for mutual benefit, or is ordered by the minister of public works, for the public good, that a central syndicate be established, it shall be composed of members named by each community proportional to the extent of their respective irrigations. [The article concludes with specifications as to qualifications, terms, etc., of members of the central syndicate.]

CHAPTER VIII.—*Of the Jury of Irrigation.*

ART. 68. The jury or tribunal which is established by article 12 of these ordinances, in fulfillment of article 212 of the law, shall have for its duty: (1) To consider and determine questions of fact which are raised concerning irrigation, etc.; and, (2) to impose on violators of these ordinances the fines and penalties due to their offense.

ART. 69. The jury shall be composed of a president, who shall be a member of the syndicate, designated by it, and of —— jurors; and there shall be an equal number of substitutes.

ART. 70. Members of the jury shall be elected at the same time and in the same manner as members of the syndicate.

ART. 71. The qualifications for a juror shall be the same as those for a member of the syndicate.

ART. 72. No person shall be at the same time a member of the jury and of the syndicate, except the president of the jury named by the syndicate.

ART. 73. A special regulation shall embody the details of powers and duties of the jury of irrigation.

CHAPTER IX.—*General Orders.*

ART. 74. The measures, weights, and money which are used in all that refers to the community shall be those legalized as the decimal metric system, which has for its units the meter, kilogramme, and dollar (Spanish).

For the measurement of waters, the litre per second shall be used as the unit; and for motive power created by the employment of waters, the kilogrammeter—a horse power being 75 kilogrammeters.

In every case these shall be interpreted and accompanied by an expression of their equivalents in the local provincial terms.

ART. 75. These ordinances do not confer individual rights not already held, nor do they take from those possessed by any member.

ART. 76. [Repeals former ordinances, if any.]

CHAPTER X.—*Transitory Orders.*

ART. 77. [Is devoted to details of temporary, preliminary, and other transitory matters of organization and business.]

APPENDIX III—B.

[Under this and other headings it was intended to include in this publication translations of the laws and regulations below named. They have been revised and their principal features abstracted in chapters XXI and XXII, and now are named with references to guide those who wish to pursue the subject further. General law of Public Works, Spain, 1877; Administrative regulation (model) for government of syndicate boards of control, Spain, 1884; Administrative regulation (model) for government of water-courts, Spain, 1884; Administrative regulation (model) for organization and government of general syndicate associations, Spain, 1884; Administrative regulation establishing rules to be followed in applying for water privileges, grants, or concessions, Spain, 1882; all to be found in the works of *Pardo* and of *Bentaból y Ureta* hereinbefore referred to.]

MEMORANDUM.

ACKNOWLEDGMENTS.

In the compilation and writing of this volume no direct assistance has been had, except in making translations. The study was undertaken at the suggestion and with the counsel of the late GENERAL B. S. ALEXANDER, Engineer Corps U. S. Army, consulting engineer to this state department in 1878, to whose memory the writer recurs with a sense of obligation for many professional courtesies and much valued advice.

The advantage of consultation with HON. JOHN B. HALL, counselor at law, Stockton, has been had during the course of the study. To the guiding influence of his learned and able criticism is due much of the merit of systemization and of thoroughness which these chapters may have, as also their freedom from certain errors which otherwise would probably have been made. The responsibility for the work, however, rests with the writer. It has not been revised by any one else.

In the years 1880 to 1882, inclusive, the advice of the late HON. GEORGE P. MARSH, United States Minister to Italy for a long period, was had by means of an extended private correspondence. For his kindly review of the first report on irrigation made by this department, and of a manuscript of the first writing of a portion of this volume; for his advice in the matter of authorities to be read, and the value to be put upon them; for his favors in collecting and forwarding a quantity of original data, and a number of pamphlet and paper publications pertinent to the subjects in hands; and for his politeness in placing the writer in correspondence with European authorities who have extended other courtesies, a great obligation was incurred which it is the object of this paragraph to suitably acknowledge.

When commercial and available private ways had been tried without success in endeavors to obtain publications and data desired, requests were made through official channels, in response to which a number of gracious and substantial favors have been received:

From E. EL CONDE DE TORENO, Minister of Fomento, Spain; volumes of the *Memoria sobre las Obras Publicas*, referred to on p. 468 of this volume. (1877.)

From SEÑOR A. PIDAL Y MON, Minister of agriculture and public works, Spain: additional volumes of the same publication, with other favors. (1884.)

From D. ANDREAS LLAURADÓ, Chief engineer, etc., Madrid; a copy of his own and other publications. (1883.)

From EL COMRE. ALESSANDRO PROFR. BETOCCHI, Inspector of the royal corps of civil engineers and member of the Superior council of public works, Italy; reports on Italian rivers. (1883.)

From EL COMRE. ANTONIO BACCARINI, Minister of public works, Italy; data respecting the Italian hydraulic service. (1882.)

From SIGNOR D. BERTI, Minister of agriculture, Italy; publications of his department, relating to irrigation. (1882.)

From His Excellency Baron Fava, Italian Minister to the United States, and through him from the Ministers of agriculture and of public works of Italy; a collection of recent Italian irrigation and water laws and regulations, and the favor of a review of the advance sheets of the part of this volume relating to Italian laws, etc. (1885.)

From Signor A. W. Lambertenghi, Italian consul at San Francisco; copies of old Sardinian and other Italian laws, and other courtesies of a substantial kind. (1884.)

From —— —— ——, Minister of agriculture, France; copies of the reports of the French government irrigation commission. (1882.)

From M. T. J. Mélino, Minister of agriculture, France; copies of the departmental bulletin containing valuable matter. (1884–1885.)

From M. Henry Grosjean, Inspector, agricultural department, France; copies of reports, etc., and other data.

For the courtesy of correspondence and transmission of correspondence and other matter, special acknowledgment is due to Signor A. de Foresta, Italian *charge d'affaires* at Washington (1885); to the Hon. F. T. Frelinghuysen, Secretary of State, Washington (1882); Hon. L. B. Morton, U. S. Minister at Paris (1882); Hon. A. A. Sargent, U. S. Minister at Berlin (1883); and Hon. A. Augustin Adee, U. S. *charges d'affairs*, Madrid (1877).

From favors thus received very much data has been culled, but it has not been possible, with the means at command, to completely avail of the opportunities thus offered. Furthermore, the great mass of matter, although pertinent to irrigation and arterial drainage subjects, has not been applicable in the chapters of this volume. Other similar courtesies have been received from other sources, which will find fitting acknowledgment in the third part of this report, where the data will be used.

The greater part of the Spanish translations have been made by Mr. Duncan Beaumont, Secretary, and of the French, by Edward Boehme, clerk in the department. Very much assistance has also been had in this way from Mr. John H. Quinton, assistant engineer, Gen. George B. Cosby, former secretary, and Mr. A. D. Splivalo, of San Francisco.

Col. Geo. H. Mendell, U. S. Engineer Corps, and Mr. James B. Eads, Civil Engineer, were associated with the writer as consulting engineers on other branches of the work, but not upon the special topics treated in this volume. Due acknowledgment of their valued counsel will be made in a publication relating to the subjects of their advice.

AUTHORITIES.

For purposes explained in the introduction to this volume, it has been an endeavor in preparing these chapters, to preserve the references to original authorities, and always to accord special credit where due. Any material omission which may have been made in this matter has resulted from accident or the unavoidable confusion in a work which has had very many interruptions and disturbed intervals. The writer is sensible of no act of plagiarism. An insensible copying of forms of expression and styles of composition is scarcely to be avoided in writing from authorities such as have been followed in this work.

It is believed that the translations made constitute the first general attempt to render into English the water-laws and regulations of the irrigation countries of southern Europe. There have been a number of limited efforts in this field; but the results of these, even, are now much behind the times.

The work of R. Baird Smith, published in 1855 (see p. 106 hereof), contained English renderings of many old Sardinian and Lombardian laws and regulations. This is the only English work wherein a real study of the water and irrigation laws of either Italy, France, or Spain is attempted; but it is far behind the times on this subject, even for the one country it related to.

The volume of C. Scott Moncrieff, published in 1868 (see page 154 hereof), contained, as appendices, translations of a part, only, of the Italian code articles relating to waters and irrigation, and also the Spanish water-law of 1866. But in each of these efforts the author took only one step into the field of this subject; and in it his results also are now in large part out of date.

The entire civil code of France is published in English, after the rendering of R. S. Richards (see p. 73 hereof). But only a small part of the water and irrigation law system of France is found in its code, although the foundation for a large part of it is there. The interpretations of these provisions and regulations under them are essential for any satisfactory understanding of them, and these it is believed first find place in English print within the covers of this volume.

Due credit has been given these translators, but in every case the originals have been examined, and material corrections sometimes made of their renderings. The Spanish general water-law of 1879 (appendix III, hereof) has, it is believed, never before been published in English, as also all of the Spanish laws and regulations, and all those of Italy bearing dates since that of Moncrieff's book (1868), and about all of the French legislation, etc., on our subject, except the part contained in the code.

The now quite old special works of Dumont, DeBuffon, Aymard, and Smith, and the somewhat newer one of Moncrieff, have been the basis of this work. Culling from them their data pertinent to the inquiry, I have then supplemented their labors on the subject as it formerly stood, by appeals to standard authorities, such as Dalloz, Merlin, Proudhon, Pigoreau, Boron, Escriche, the Novisima Recopilacion, and the translations from some of these and others, by Richards, White, and Rockwell.

The work has then been brought forward, added to, and the field broadened, upon the authority of the volumes by De Passy, Malapert, Barral, Llauradó, Pardo, Bentaból y Ureta, the *Memoria sobre las obras publicas*, and articles and laws in the *Annales des ponts et chausseés*. And the subject has been further illustrated upon the authority of the writings of Reclus, Debauve, Mangon, and Marsh.

On points of history, politics, institutions, and general statistics, not supplied by the special works examined, the books of Hallam, Sismondi, Wallis, and Martin, and the encyclopædia articles found duly credited were examined. And, finally, the last governmental publications of laws and regulations were specially obtained from Italy and Spain, which, with the aid of other data, and the suggestions and advice elsewhere acknowledged, have enabled the writer thus to close the work to late dates.

OTHER REPORTS, AND THE MAPS OF THE DEPARTMENT.

In addition to this general report on irrigation, the State Engineering Department has prepared the matter for other publications.

A volume of data and statistics of rainfall, temperature, evaporation, drainage basins, flow of streams, flow of artesian wells, topography of river channels, land classifications, etc., is now in course of printing. Another extended work on the state and county boundaries, and their descriptions, prepared under

special instructions from the legislature, is likewise in course of publication. The data for a volume of statistics of water-right claims, and irrigation and canal incorporations, is in large part in hands; as also that for a report on the flood phenomena, arterial drainage problems, and history of reclamation enterprises in the central valley of the state; but at this time it is not known that these two last works will be completed.

There will be presented to the next legislature a report on the work and methods of the department, and a synopsis of the present and all other reports issued by this department to that time.

There are in this office the following named maps, the completion and publication of most of which is contemplated:

I—A general map of the State of California, on the scale of six miles in the inch, covering a space of about ten feet square. It has been the intention to make this a topographical and general land map, showing land divisions down to sections of the public land surveys, and to publish it in a form suitable for a wall map in three parts—Northern, Middle, and Southern California.

II—Twenty-five atlas sheet maps, on the scale of four miles in the inch, each thirty-six inches long by twenty-three inches wide, together embracing the whole state, and accompanied by a map of the state, in outline, on one sheet of the same size, and serving as a key to the separate sheets. These maps are prepared as land maps in detail, and show the topography of the country in so far as lines of drainage and principal well established features are concerned, but no attempt to make them topographical maps in detail, as to mountain and hill representation, will be made. In the preparation of this set of maps it has been the intention to publish them as outline maps and in the form of an atlas, and have them serve as the basis of the future physical survey of the state, which, now commenced, will doubtless be completed at some time in the future. The scale of these maps is sufficiently large, and the detail shown is sufficiently minute, to render them desirable and valuable locally as land maps.

III—A general drainage area map of the state of California, on the scale of twelve miles in the inch and occupying a sheet fifty-four by sixty inches. This map shows the lines of drainage for the entire state and the outline of the chief physical features of the country, and is intended as a general illustration to accompany the report on irrigation. It is the first attempt at a skeleton physical map of the state, and will serve the purpose of such map until the state becomes well settled, and the details of its physical geography are much better known than they are now. This map would serve as the general illustration of a much more detailed and extended report than the state engineer is able to make now with the data at hands.

IV—A general topographical map of the Sacramento, San Joaquin, and Tulare valleys, and adjacent foothill regions, showing twenty-foot contour curves—or lines of equal height on the ground's surface, for each twenty feet above the level of low tide in the bay of Suisun—for all the valley lands, and hachured topography for the foothill region. This map has been prepared as the general illustration of the report on irrigation for the valley, as well as for the basis of a detail exhibit of the general subject of the physical survey of the state. It represents the result of a great amount of information acquired by original field work of this department, and by private and other surveys, now for the first time connected up and utilized to show, approximately, the elevation, fall, and slope of the plains at every point, and the outlining and form of

the foothill topography. It is on the scale of six miles in the inch, and may be published on a sheet seventy-two inches long by twenty inches wide.

V—Four detail topographical and land maps, together embracing the San Joaquin and Tulare valleys, including the Mokelumne and Kern river regions at the extremes, and showing contour lines of location for every ten feet in elevation, above low water in the bay, for the valley lands, and showing the foothills and valleys outlined in detail. These maps, so far as topography is concerned, are in large part the results of original surveys or reconnoissances by the state engineering department, and otherwise are based on surveys of the United States engineer corps, various railroad and canal companies, and private individuals, which have been connected by the state work, and thus made available. The maps are on the scale of two miles in the inch, and each occupies a sheet about sixty-six by thirty inches. They have been prepared as an exhibit in detail of the general subject of irrigation in and for the region which they cover, and are intended to accompany the report.

VI—A detail topographical map of each of the rivers: American, Mokelumne, Stanislaus, Tuolumne, and Merced, from their respective cañon mouths to their points of flow through the open plains These maps embrace their respective rivers and adjacent regions, from the upper to the lower point, at which it is at all likely water will ever be diverted from them for purposes of irrigation on the plains, and have been prepared as detail exhibits of the subject of diversion of waters for irrigation. They each occupy a sheet about twenty-four by forty-eight inches in area, are on the scale of 3,000 feet in the inch, and are intended to accompany the report on irrigation. Maps of the San Joaquin, Kings, Kern, and other rivers on this scale have not been attempted.

VII—A general topographical and land map of the basins and valleys of the Santa Ana, San Gabriel, and Los Angeles rivers, embracing all the territory of Los Angeles and San Bernardino counties draining into the ocean from the headland above Santa Monica to that next below the mouth of the Santa Ana river. This map includes the thickly settled and irrigated regions of southern California, and is intended as a general illustration for the report on irrigation for that region. It is on the scale of two miles in the inch, and occupies a sheet about five feet by three feet.

VIII—Detail maps of each township or part of township, on a scale of half a mile in the inch, of the irrigated valley lands of Los Angeles and San Bernardino counties. These are the detail exhibits as to irrigation in the region named, and should be published on about half their present scale, to accompany the report.

IX—Detail maps of the San Joaquin, Kings river, Kaweah, Tule, and Kern river irrigation districts; showing rivers, canals, ditches, land divisions, and extent and classification of irrigations. These maps are on a scale of one mile in the inch, and are to be published as illustrations of the report on irrigation.

Most of the local maps will be published in very cheap but useful styles, and all published will be sold at a small advance on cost of publication, as by the law directed.

WM. HAM. HALL, State Engineer.

PUBLICATION.

This volume is published under and by virtue of the following Joint Resolution, adopted by the Legislature of California, on March 9, 1885:

ASSEMBLY JOINT RESOLUTION No. 1—AUTHORIZING AND DIRECTING THE PUBLICATION AND DISPOSAL OF THE REPORTS AND MAPS PREPARED BY THE STATE ENGINEER.

Resolved by the Assembly, the Senate concurring, That an edition, not to exceed three thousand copies, of the final report of the State Engineer, on the Problems of Irrigation, as outlined in the report of progress made to this Legislature, for the years eighteen hundred and eighty-three-eighty-four, together with the maps and diagrams accompanying the same, be printed and published under the joint direction of the Governor, the Superintendent of State Printing, and the State Engineer, and in good, substantial, useful, and salable style, as by them to be determined.

Resolved, That these works shall be disposed of as follows:

Five hundred copies to be distributed gratuitously, under the direction of the Governor, to free libraries, state institutions, and in exchanges with foreign societies and institutions, and notable persons; two thousand five hundred copies to be delivered to the Secretary of State, to be by him kept on sale at prices to be fixed by the Governor, at amounts about twenty-five per cent advance on cost of publication.

Resolved, That all moneys received from said sales shall be duly and separately accounted for, and immediately be paid into the State Treasury, to the credit of the General Fund.

Resolved, That a short abstract of the full report may be prepared, printed, and distributed gratuitously throughout the country, for the purpose of placing the main points of the work before the public, and as an advertisement of the work itself on sale.

In compliance with this authorization, this volume may be had, on application, by book dealers and by individuals, as will be announced in an advertisement following the index.

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